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UNIVERSITY OF ALBERTA

FACULTY OF ARTS AND SCIENCE

(Department of Political Economy)

A THESIS

THE LAND CLASS AS A BASIS FOR THE DISTRIBUTION OF AN ACREAGE BONUS WITH SPECIAL REFERENCE TO SOUTHERN ALBERTA

Submitted in partial fulfilment
of the
requirements for the degree of
Master of Arts

(Master's Program: six graduate courses in addition to this thesis)

by

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April 8th, 1940.

Thesis
1940
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ACKNOWLEDGEMENTS

The statistical data used in this investigation have been taken from material collected in connection with the survey of the Alberta Special Areas carried out by the Economics Division of the Dominion Department of Agriculture in co-operation with the University of Alberta.

Acknowledgement is also made to the members of the Department of Political Economy of the University of Alberta for the valued assistance and advice that they have given.

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THE LAND CLASS
AS A BASIS FOR THE DISTRIBUTION OF
AN ACREAGE BONUS
With Special Reference to Southern Alberta

INTRODUCTION

At rather frequent intervals during the last ten years it has been found expedient to subsidize the agricultural industry of western Canqda. The subsidies which at various times during this decade have been paid to wheat producers in the prairie provinces do not, of course, represent the first subsidization of Canadian industry since 1867. Direct subsidies have from time to time been paid to the steel industry of Nova Scotia and the coal industry of Alberta. These bonuses, however, constitute the first direct cash subsidies on the basis of wheat production which have been paid to prairie farmers.

Once it has been decided to bonus any industry, the extent of the bonus, the method of awarding it, and its probable effects, are matters of prime importance. A critical examination of the second of these considerations constitutes the scope of this thesis. We are concerned with assessing the worth of a possibly more economic method of administering

such assistance.

The method selected in awarding a bonus or subsidy to an industry depends closely upon two factors, the conditions prevailing within that industry, and the object in pursuit of which the bonus is being awarded. Since the method of subsidization is closely dependent upon the conditions of production within the industry, it is felt that a brief discussion of these "conditions" is an essential prerequisite to an intelligent discussion of the bonus itself. For the purpose of our investigation, we have selected as our universe of reference, an area which, while not representative of the entire agricultural area of the prairie provinces, is representative of a considerable proportion of it. This area, to which the following thesis has specific reference, is the first six census divisions of the province of Alberta.

This thesis is not concerned with defining and delimiting farm operators' "need" and prescribing or awarding a bonus to meet this need. Such an analysis is beyond the scope of this discussion. We accept rather the postulate upon which the Prairie Farm Assistance Act is based. "Need" is determined by the average yield which a farmer receives during any one particular crop year. We are concerned with the problem of awarding to the farmer a bonus which is graduated in amount according to "need" as so defined.

Our position then is a more limited and less ambitious one than that of examining the condition of need in which various operators for diverse reasons find themselves. We accept rather a definition of "need", examine existing legislation and propose new in the light of this definition. That the definition of need may itself be objected to we admit; to critically examine the definition which we propose to accept as a premise is beyond the scope of the present investigation.

CHAPTER I

THE POSITION OF THE "WHEAT ECONOMY" AS A PART OF THE NATIONAL ECONOMY

The situation which rendered expedient the bonusing of the prairie wheat producer is the resultant of the unfortunate conjuncture of two circumstances, the one economic and the other physical, low wheat prices, and low yields. The explanation of the first of these circumstances is to be found mainly in conditions prevailing beyond the bounds of the Canadian economy. We think it may be stated without exaggeration that the base upon which the Canadian economy rests is her agricultural industry and the principal product of this industry is wheat.

"We have other agriculture, and we have other industries, but they form part of an economic fabric, the strength of which depends mainly upon what happens to wheat. There is no other corresponding area and no other corresponding population in the world so dependent upon export trade in wheat". (1)

And again, "The Canadian economy has, to a very large extent, been built around its export industries, chief among which has been the wheat industry. For many years now Canada's exports of wheat, wheat flour, and

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(1) Submission presented to the Dominion Government on behalf of the Western Committee on Markets and Agricultural Readjustments - Hansard 1939, p 4113.

other milled products, have constituted from 20 - 38 per cent of Canadian export trade. The wheat industry has established very substantial foreign credits which have been an essential factor in the service of the country's external debt, and in the provision of new capital in the maintenance of a rapidly growing country". (1)

When it is remembered that on an average approximately two thirds of the Canadian wheat crop is exported, (2) it is evident that the welfare of the Canadian economy as a whole is closely associated with the demand for wheat in the markets of the world. Canada is forced to share this world market with such exporting countries as Argentina, Australia and the United States. Whatever the price may be in the world market, it is expected that the price which the wheat from each of these exporting countries brings, will, allowing for differences in quality, be the same. This does not mean, however, that, except for transportation costs, and differences in rates of exchange, the producer in these various countries receives the same price.

Such is not the case. The respective governments of Canada's three exporting competitors are all either subsidizing exports, paying a minimum price on all wheat produced and sold, or raising the price paid to the

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(1) Loc. Cit. p 4114.
(2) Hansard p 4113.

producor on all wheat consumed domestically. In addition to the above assistance, the Argentine and Australian governments "have adopted monetary policies which have facilitated exports and at the same time have improved the relative position of their producers within their domestic economies". (1)

In the United States under the Wheat Programme of 1933 - 1935 "parity payments" were made to producers on the domestically consumed portion of the crop. The parity price is that price for which wheat would have to sell in order to give this commodity the same purchasing power with respect to those things which farmers buy as was possessed by wheat during the pre-war period of 1910 - 1914. In addition to a parity payment, the American farmer who adheres to his acreage allotment will receive a payment of seventeen cents per bushel for the "normal" yield on this acreage allotment. The sum of these benefit payments represents a payment of approximately 27 cents per bushel of this normal yield.

In addition to these payments, the American government stands ready to lend from 58 to 84 cents per bushel on the security of wheat to "co-operating producers".

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(1) According to a statement made to the House of Commons on May 10th, 1939, by the Hon. J. G. Gardiner. Hansard, p 4115.

The precise amount is determined by the percentage which the market price is of the parity price which is set at $1.11 per bushel. This loan for the 1938 crop is on an average about 60 cents per bushel. Together then with loan and benefit payments, the farmer is receiving approximately 85 cents a bushel for his wheat.(1)

In addition, the United States "is financing the operations of exporters who find it necessary to sell to buyers in other countries at prices lower than the current market prices paid to domestic producers". (2) All of these assistance measures to American farmers render it more difficult for the Canadian producer to compete unassisted in the open market.

The position of the agricultural industry in Australia is in many ways similar to that in Canada insofar as heavy protection to secondary industry is concerned. Bonuses were paid to wheat producers in Australia for five years in succession, from 1931 to 1935. These bonuses were at first paid upon an acreage basis and later upon a combined bushel and acreage basis. There is in addition a "hardship grant", somewhat similar to the Crop Failure Assistance section of the Canadian Prairie-Farm Assistance Act.

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(1) These figures are those quoted by Mr. R. M. Evans, of the U. S. D. A. in an address "The Wheat Problem of the United States" delivered to the Bracken Conference on Markets. Proceedings p 93.
(2) Ibid. p 92.

These farmers whose yields fall below a specified minimum qualify for this additional subsidy. The amount paid as bonus during the five year period specified was 14,400,000 pounds Australian.(1)

The Argentine government in an effort to help the primary producer of export commodities devalued its currency and established a minimun price for wheat. The cost of maintaining this bonus has been met from profits derived from the operation of a margin established between the official buying and selling price of foreign exchange.(2)

Consequently, irrespective of Canada's absolute advantage in producing wheat, the Canadian producer is forced to compete in world markets with a subsidized product.

The value of Canada's exports of wheat in 1928 constitutes 35 per cent of the value of her total exports for that year.(3) These same exports of wheat represented

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(1) As quoted by P. F. Bredt in an address "The Wheat Industry of Australia" delivered to the Bracken Conference. Proceedings p 114.
(2) According to a statement made by Dr. D. A. MacGibbon Ibid. p 115.
(3) Canada Year Book, 1929, p 486.

52 per cent of the world wheat exports for the same year.(1) These figures give some indication of the sensitiveness of the Canadian producer to the world demand for wheat.

Political conditions within those countries which were among Canada's most important customers have decreased those countries' imports of wheat. Because of their desirability from a military point of view, these countries have erected barriers in the shape of high tariffs against the importation of foreign wheat. Prior to the outbreak of war this was particularly the case with respect to Germany, Italy, and France. While the street price of wheat in Alberta was fifty-eight cents as it was in 1938 (2)

> "the consumers of wheat in some of the formerly large wheat importing countries of continental Europe are actually paying as high or higher than $2 per bushel for wheat used in their breadstuffs".(3)

Italy during the early twenties was the largest importer of wheat in continental Europe. With the development of the Facist policy of self-sufficiency, imports were cut from an average of 80 million bushels for the period 1923 - 1928 to 18 million bushels in 1937. This reduction in imports was achieved both by increasing domestic production and decreasing domestic consumption.

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(1) Proceedings of the Conference on Markets for Western Farm Products, p 13.
(2) Bulletin of Agricultural Statistics, January 1939.
(3) According to a statement made by the Hon. J. G. Gardiner, May 10th, 1939. Hansard, p 4114.

Germany by virtue of a similar policy and similar methods, reduced her imports from an average of 70 million bushels during the twenties to 8 million bushels in 1937. France, herself a large producer of wheat, normally provides for her own requirements and in good crop years has a "surplus" for export. She rarely imports, even in poor years, in excess of 10 million bushels.

Britain is at present the largest importer of wheat, her imports amounting to 40% of the world's total import requirements.

The domestic producer is guaranteed a minimum price of $1.30 per bushel on that portion of the domestically produced crop which is less than 67 million bushels. In all of those countries low world prices have no discouraging effect upon domestic production since they are rendered inoperative by "fixed" prices.(1)

Because of these nationalistic policies of protection in the European importing countries whatever elasticity there may be in the consumers' demand for wheat, it is not allowed to exert its corrective influence upon price. The consumption of wheat in these importing countries does not increase with low world prices if consumers are not allowed to take any advantage of these low prices.

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(1) Figures are as quoted by Dr. L. A. Wheeler, U. S. D. A., in an address to the Bracken Conference. Proceedings p 81.

CHAPTER II

PROBLEMS OF PRODUCTION

This cursory survey of some of the more obvious causes responsible for the low prices of wheat is of significance in that it may give some indication of the degree of permanency of this low price. What is of importance for our purposes is the low price itself, since it is a co-determinant of the wheat farmer's gross income. The other factor entering into the picture is yield and yield records are closely associated with the physical and meteorological conditions prevailing within the area. This factor will be dealt with more fully. Suffice it to say here that within the area of reference, yield is both uncertain and highly variable.

The gross income of an industry as of a single operator is by itself inadequately indicative of the financial position of that industry or individual. It is net income which counts and net income depends not only upon gross receipts from crop sales and other sources but also upon costs of operation. The prairie wheat

farmer is concerned then not only with his crop and the price of wheat but likewise with the cost of those things which have been necessary to the production of that crop. What does it cost him for his farm machinery, for his motor fuel, for his labor, for his living expenses and to service his debt and pay his taxes? It is in this respect that the Western Canadian farmer finds himself in a very exposed position.

If I may be permitted to repeat an argument which has been labcured by every voluble friend of the farmer upon every possible occasion, it is this: the Canadian farmer sells his product in an open market and makes his purchases in a closed market. The result is that the price which he receives for his product fluctuates greatly according to conditions of demand and supply in the markets of the world while the prices which he pays for those goods which he uses in the process of production are relatively stable. The market in which these producers' goods are sold is protected from outside competition by a tariff barrier. The result is that gross income falls off with the drop in prices while expenses of production remain fairly constant. The farmer suffers by having his purchasing power drastically reduced. The argument

is presented in statistical form in the following table compiled by the Searle Grain Company.(1)

TABLE I

INDEX NUMBERS OF PRICES RECEIVED BY WESTERN CANADIAN FARMERS FOR NO. I NORTHERN WHEAT AND OF PRICES PAID FOR 147 ITEMS OF THINGS FARMERS BUY

Crop year ending July 31	Index No. of price received by farmers for wheat	Index No. 147 items things farmers buy	Index No. of farmers' purchasing power
1914	100	100	100
1915	164	99	166
1916	136	109	125
1917	272	125	218
1918	295	156	189
1919	300	177	169
1920	357	196	182
1921	263	195	135
1922	160	171	94
1923	132	164.	80
1924	123	163	75
1925	218	157	139
1926	192	157	122
1927	185	158	117
1928	185	159	116
1929	152	162	94
1930	154	155	99
1931	67	138	49
1932	60	130	46
1933	52	124	42
1934	73	124	59
1935	93	126	74
1936	97	127	76
1937	153	134	114

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(1) The Searle Index - published by the Searle Grain Co., Winnipeg, Manitoba.

Note: Wheat basis No. 1 Northern Street at country elevator - average western point (24 cents per 100 lb. freight rate). The 147 items bought by farmers include groceries, clothing, machinery, repairs, farm supplies, household equipment and municipal taxes. The index number is weighted.

Thus apart altogether from fluctuations in yields the farm operator is the first to suffer from the fall in prices which accompanies an economic depression. During the last decade, however, this already pressing situation has been aggravated by subnormal yields, a condition largely due to abnormally low precipitation during this period. The following table presents a comparison of the average yields within the area of reference for the periods 1921-29 and 1930-38 inclusive.

TABLE II

COMPARATIVE YIELDS FOR THE PERIODS

1921-1929 AND 1930-1938
from Statistics Branch
Dominion Department of Agriculture, May 1938

Census Divisions I - VI inclusive

Census Division	Average Yield 1921-1929 (1)	Average Yield 1930-1938 (2)	Percentage which (2) is of (1)
I	13.84	9.525	68.82%
II	20.16	17.41	86.36%
III	13.82	10.28	74.38%
IV	21.22	14.53	68.47%
V	14.96	8.70	58.16%
VI	18.98	15.23	80.24%

The period from 1921-1929 was one of comparatively good yields while the period from 1930-1938 included some of the driest years on record. The extent to which average yields fell off during this latter period is evident from column (3). It is also apparent from the above table that the average yields within Census Divisions I, III, and V are considerably lower than for Census Divisions II, IV, and VI. Owing largely to the difference in physical factors in the area comprised by the first group yields are more highly variable than in the second group of Census Divisions.

The variability of wheat yields in Alberta relatively to the other two prairie provinces is shown in the following table;

TABLE III

(1) VARIATION IN PER ACRE YIELD

1908-1928

FOR THE THREE PRAIRIE PROVINCES

Province	Coefficient of Variation	Standard Deviation	Average Yield
Saskatchewan	23.0%	4.6 bus.	17.0 bus.
Alberta	36.2	7.0	19.3
Manitoba	27.2	3.9	17.0

(1) Statistical Atlas of the Prairie Provinces p 32.

The chances of an abnormal crop as shown by the variation of the average yields of this period from their average, is greater for Alberta than for either Saskatchewan or Manitoba. The average yield per acre however, is slightly higher for Alberta.

A comparison of prices and production together with gross value of wheat sales for Census Divisions I - VI is shown by the following table. The value of wheat sales is obtained by deducting from gross production 1½ bushels per acre for seed and waste and multiplying by the average price for the crop year, i.e. from August 1 - July 31. This price is the average price of wheat in Alberta. The average yield for the province for each year is placed in the table in order to show something of the comparative productivity of this area and that of the province as a whole.

TABLE IV

PRICES, PRODUCTION, VALUES AND ACREAGE OF WHEAT FOR CENSUS DIVISIONS I-VI

1921 - 1938

Year	Average Price of Wheat in Alberta	Gross Production in bushels	Acreage in Wheat	Average Yields for Census Divisions I-VI	Average Yield for Province	Values of Wheat Sales ($000)
1921	.77	36,597,000	3,247,000	11.27	11.40	24,429
1922	.77	38,665,000	3,400,000	11.37	11.40	25,845
1923	.65	83,805,790	3,067,193	27.32	28.00	51,484
1924	1.20	32,223,756	3,305,313	16.54	11.00	32,719
1925	1.19	55,646,482	3,364,249	16.54	18.00	60,095
1926	1.05	60,036,500	3,412,000	17,59	18.50	57,664
1927	.98	99,211,000	3,492,000	28.41	27.40	92.094
1928	.75	99,000,000	3,581,000	24.56	23.20	61,971
1929	1.02	46,516,454	3,867,251	12.02	12.00	41,530
1930	.45	54,900,000	3,726,500	14.73	18.60	21,740
1931	.36	51,750,000	4,010,000	12.90	17.70	16,465
1932	.32	81,265,050	4,065,500	19.98	20.40	24,053
1933	.45	40,474,700	4,115,300	9.83	12.96	15.436
1934	.58	47,759,537	3,857,850	12.38	15.00	24,344
1935	.61	55,180,095	4,090,750	13.48	13.20	29,917
1936	.92	22,658,000	4,093,200	5.53	8.80	15,197
1937	1.02	35,314,000	4,049,000	8.72	9.40	29,825
1928	.58	77,492,000	4,306,500	17.99	17.90	41,199

The average prices of wheat in Table IV were taken from the Monthly Bulletin of Agricultural Statistics - February 1929, March 1928, and January 1939. Production and Acreage data are taken from the "Statistics of Principal Grain Crops," a bulletin published by the Alberta Provincial Dep't. of Agric.

The average of the average yields for these 18 years for the six census divisions is 15.61 bushels while the average yield for the province for the same period is 16.38 bushels. The extreme fluctuations in price, production and value are apparent while the acreage seeded to wheat shows a steady increase. In order to give a clearer picture of these fluctuations, they are reduced to an index number basis. In each case the crop year, August 1, 1926, to July 31, 1927, is taken as the base period and rated as 100.

TABLE V

RELATIVE PRICES, PRODUCTION, VALUES AND ACREAGE OF WHEAT

for Census Divisions
I-VI
1921-1938

1926=100

Year	Relative Price per bu. in Alberta	Relative Production	Relative Acreage	Relative Value
1921	73.3	61.0	95.0	42
1922	73.3	64.4	99.6	45
1923	61.9	139.6	90.0	89
1924	114.3	53.7	97.0	57
1925	113.3	92.7	99.0	104
1926	100.0	100.0	100.0	100.0
1927	93.3	165.3	102.0	160
1928	71.4	146.6	105.0	107
1929	97.1	77.5	113.0	72
1930	42.9	91.4	109.0	38
1931	34.3	86.2	118.0	29
1932	30.5	135.4	119.0	42
1933	42.9	67.4	121.0	27
1934	55.2	79.6	113.0	42
1935	58.1	91.9	119.0	52
1936	87.6	37.7	120.0	26
1937	97.1	58.8	119.0	52
1938	55.2	129.1	126.0	71
Average for Period	72.32	93.24	109.14	65.22
Standard Deviation	22.27	35.08	10.54	34.67
Coefficient of Variation	31.40%	37.62%	9.66%	53.16%

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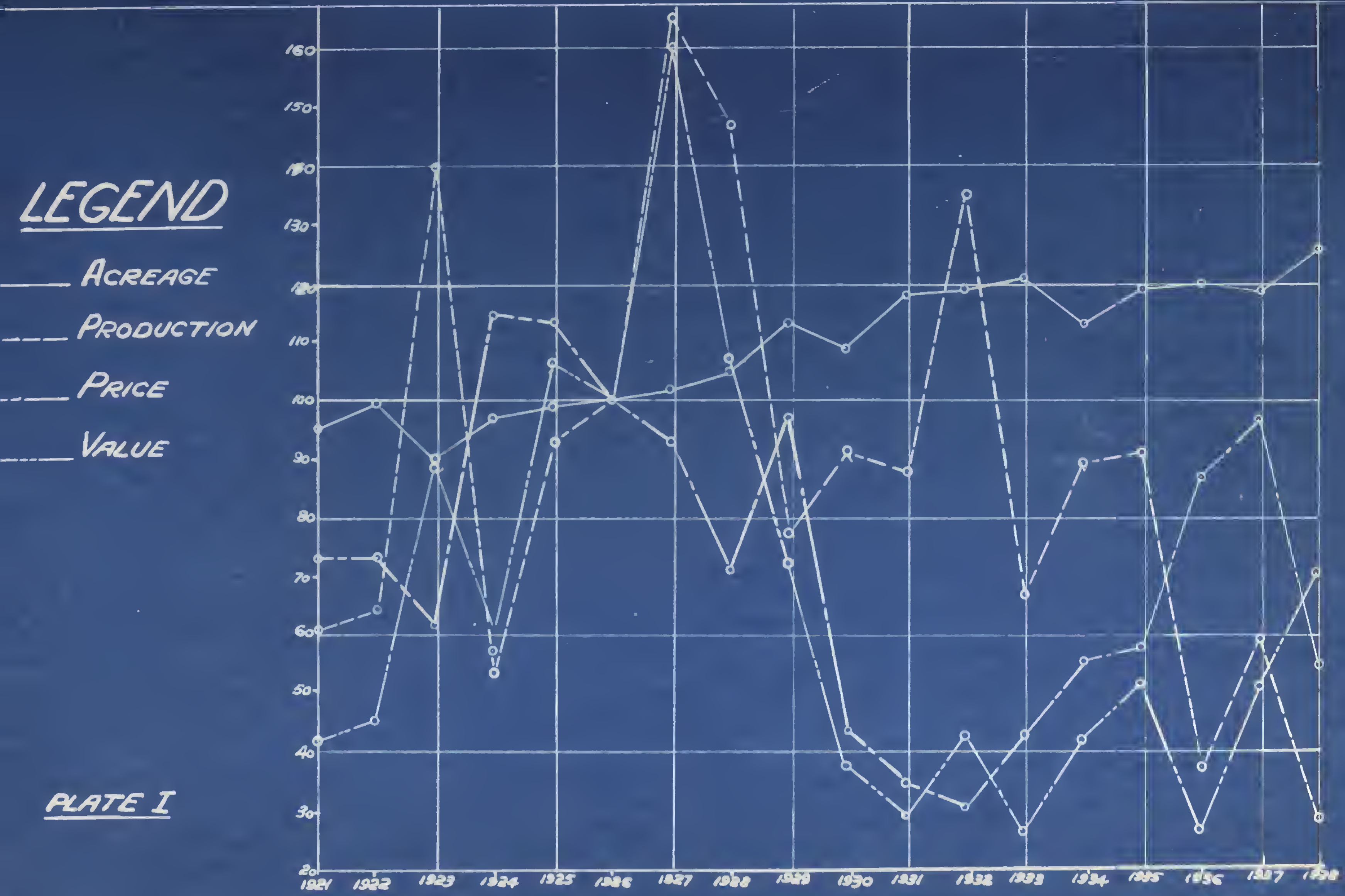

PLATE I

It is apparent from this table that the fluctuations in production were slightly greater than the fluctuations in price. The coefficient of variation of the former from its average for the period being 37.62% while the latter is 31.40%. The cumulative effect of these two factors upon value is seen from the high coefficient of variation of the latter, 53.16%.

It might be expected that with a fall in production the gross costs of production would decline proportionately maintaining approximately the same per unit costs of production. This however, is not the case. The sharp fluctuations in production are, of course, involuntary from the operator's standpoint. The decline in yields is due to such natural factors as drought, insect pests, hail, plant disease and so forth. It is a reduction in average as well as total yield.

The gross expenses of production are relatively fixed irrespective of total yield. With a smaller yield the total costs of harvesting and transporting to market will be less but the cost of production per bushel will not be reduced in anything like the same proportion as the yield. According to an average of figures taken from farm management studies in the province of Saskatchewan and summarized

by W. A. Mackintosh, the average of variable costs to total costs in the Belbeck, Melfort and Swift Current Areas was 41.1%. (1) This factor in addition to the flexible product-price situation and rigid cost structure serves to accentuate the fluctuation in net revenue.

In the absence of net revenue figures for farmers in the area of reference, this data on yields, prices and value may serve to give some indication of the fluctuations in net revenue from wheat sales. No figure is available for the area of reference as to the proportion which the revenue from wheat sales is of total revenue. Professor E. C. Hope quotes a figure for the brown and dark brown soil zones of the Saskatchewan plains region, an area which is fairly comparable to the area of reference. Here he says: "the typical farm obtains 85 to 90 per cent of its cash income from sales of wheat. The balance of the income is about equally divided between sales of coarse grains and livestock and livestock products". (2)

The net result of these extreme fluctuations in net income to the Western farmer has been to place him in many cases in a destitute position. Unable to pay his taxes, to replace his equipment, to keep his fences and

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(1) Economic Problems of the Prairie Provinces p 29.
(2) Prof. E. C. Hope - "What the Price of Wheat Means to Western Farmers" an address to the Conference on Markets for Western Farm Products - Proceedings p 148.

buildings in repair, to service his debt and maintain his standard of living he has been forced to use up his accumulated reserves and finally to receive either feed and seed relief, direct relief, or both. The inability of whole communities to meet their taxes has resulted in the deprivation to themselves of many social services which have become an accepted part of civilized life. In an effort to alleviate this predicament of the Western farmer the Dominion government introduced a system of crop bonusing.

CHAPTER III

THE HISTORY OF THE WHEAT BONUS AND THE FIXED PRICE IN CANADA

A fixed price for wheat was established as early as 1916 when the Canadian government set the price at $2.40 per bushel. In the next year the Board of Grain Supervisors, which was to all intents and purposes a wheat board, was established. This organization was designed to constitute a central selling agency to handle grain destined for the Allies and Great Britain. In 1917 the price was fixed at $2.21 and in 1918 at $2.24½.

In the summer of 1919 before the crop was harvested the Canadian Wheat Board was set up to replace the Board of Grain Supervisors. This Board made an initial payment of $2.15 a bushel for No. 1 Northern at Fort William. Each person selling grain to the Board received a participation certificate on which an interim payment of 30 cents and a final payment of 18 cents was made bringing the total price paid per bushel up to $2.63.

After this crop of 1919 which was marketed through the Board, Canadian wheat was again sold on the open market despite agitation for the renewal of a government marketing board. As an answer to this demand co-operative wheat pools were

established in Alberta in 1923 and in Manitoba in 1924. After the severe drop in prices in 1931 the Pools found it impossible to finance themselves by their own operations. According to a statement made by Mr. Gardiner in the House of Commons on May 5, 1939, "The financial difficulty of the Pools was the result of their inability in the face of public disapproval to lower their initial payment after the high prices of prosperity years".(1)

In 1931 in an effort to raise the price of wheat to the producer the Conservative government drew up and passed a bill (Aug. 3, 1931) providing for the payment of 5 cents per bushel for every bushel of wheat marketed in the provinces of Manitoba, Saskatchewan and Alberta. This act was apparently worked out during the early summer of 1931 and was intended purely as a price supplement on a uniform crop. However, a drought causing widespread crop failure occurred and despite this reduction in yield, "the bonus cost this country thirteen million and some odd thousand dollars".(2)

The ravages of the drought were of course not uniformly distributed over the wheat producing area. The northern park belt of the three prairie provinces was affected little if ~~any~~ at all by the dry summer. In the

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(1) Hansard p 3892.
(2) Mr. Gardiner - ibid. p 3897.

south a severe crop failure occurred. Under the bonus scheme the northern area got both the bonus and the crop while the southern belt received little or nothing. Conditions within this area were so acute that Parliament found it necessary to vote 10 million dollars for the relief of dried out areas in southern Saskatchewan.(1)

The criticism to be made of this method of bonusing wheat is of course obvious. The farmer who had a crop received the bonus while the one who didn't and whose need was for that reason so much the greater received nothing.

In July 1935 the Conservative government passed an act known as "The Canadian Wheat Board Act, 1935". This legislation established a board of three members whose duty it was to buy wheat from the producer at such price as determined by the Board with the approval of the Governor-in-Council and to sell this wheat as it might see fit.

This price to the producer was really an initial advance and the seller received a participation certificate entitling him to receive a pro-rata share of any surplus which might be left over after the disposal of the grain and the payment of costs of operation. The Act as drawn up in 1935 applied only to the provinces of Manitoba,

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(1) Hansard p 3897.

Saskatchewan and Alberta. The "fixed price", really an initial payment, was fixed at 87½ cents for the 1935 crop year.

As might have been expected and as actual experience confirmed, grain was delivered to the Board only when the market price was below the initial advance so that the act in effect served to bonus the producer by an amount equal to the difference between the initial advance and the market price. According to a statement made by Mr. Gardiner in the House of Commons on May 5, 1939, this legislation resulted in the payment of an average bonus of four cents a bushel to the farmers in 1935. Speaking of the application of this act the Minister of Agriculture said in part, "We paid a bonus of four cents a bushel to the farmers in 1935 under the legislation. It did not show the same weakness in 1935 as it did in the previous year, (1931), nor did it show the same weakness as in 1938. While the 1935 crop was rusted, it was fairly evenly distributed over the whole country and no great inequality resulted. There were no inequalities of any extent in its application". (1)

This act continued to remain in effect during 1936 and in 1937 and the initial advance was held at 87½ cents Fort William. However since the average price for these two years was $1.22 and $1.31 respectively, (2) no wheat was

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(1) Hansard p 3897.
(2) As quoted by Mr. Gardiner - Hansard p 1125, Feb. 16, 1939.

delivered to the Board. An Order in Council was passed providing that the Board would not accept delivery of grain until and unless the price for such grain fell to 90 cents. The purpose of this regulation was to prevent a comparatively few staunch supporters of co-operative marketing from selling their wheat to the Board regardless of the initial price in relation to the market price. The unit costs of handling such a small amount of grain would have been prohibitive.

Due to unsettled political conditions in Europe and the prospect "of an enormous world production" the initial advance was set by the Board for the 1938 crop at 80 cents, Fort William, a decrease of 7½ cents in the advance. Again quoting from a speech made by Mr. Gardiner in the House of Commons on February 16th, 1939,

> " This price (80 cents per bushel) has resulted to date in paying to the producer what amounts to a bonus of from fifteen to twenty cents a bushel".(1)

The same criticism which may be levelled against the nickel bonus of 1931 is applicable to this minimum price paid in 1938. It paid a considerable bonus to the man who had a large crop and nothing to the farmer who suffered a complete crop failure. It constitutes a fair illustration of the biblical adage: "To him that hath shall

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(1) Hansard p 1125.

be given". The fixed price per bushel might serve at short notice in an emergency but it does not by itself provide a fair and equitable manner ~~in which to base a premeditated system~~ of wheat bonusing upon the basis of need.

In June 1939, an amendment was made to the Wheat Board Act of 1935. This amendment established by statute rather than by order in council as had previously been done a minimun initial payment of 70 cents Fort William. It also empowered the Board to purchase grain in Eastern Canada at a price which would be the same on the farm as that paid in western Canada. The third important change was the restriction which was placed upon the amount which the Board might purchase from any one individual. This amount was placed at 5,000 bushels. In conjunction to this amendment to the Wheat Board Act was passed the Prairie Farm Assistance Act which provided in addition to the minimum advance an acreage bonus graduated according to average yield per acre within the township.

Prior to the passage of the Prairie Farm Assistance Act no attempt was made to segregate those farm operators with lower yields from those with higher yields. Although

the government admitted that the purpose of the bonus was to alleviate an emergency need it made no provision for graduating its assistance according to this need. Indeed the effect of its legislation was exactly the reverse. Another effect of this legislation which was undesirable was that it encouraged the expansion of seeded acreage. Mr. Gardiner himself was well aware of this defect. Speaking in the House on February 16th, 1939, he said - "This bill (Prairie Farm Assistance Bill) will be drafted on the principle that assistance will be given in proportion to need, calculated on an acreage basis, and so adjusted as to encourage home building and maintenance rather than increased wheat production". (1) The inference would seem to be that the previous legislation had encouraged increased wheat production and had done so at the expense of not encouraging home building and maintenance.

The Prairie Farm Assistance Act was then passed in an effort to overcome some of the rather glaring inequalities of the bonus which had been awarded upon a bushel basis. It represents an effort upon the part of the government to award a bonus more closely graduated according to need. The object is to assist the farmer across a period of difficulty; to help him to keep his home and his equipment in repair as against the time when he will once again be able to make his own way.

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(1) Hansard p 1128.

There are two principal provisions made under the Prairie Farm Assistance Act. The first, known as the National Emergency section is designed to cope with low prices and any year in which the average price (1) per bushel is less than 80 cents may be declared by the Governor-in-Council to be an emergency year. The second section, known as the Crop Failure Assistance section is designed to cope with a condition resulting from widespread crop failure from any cause other than hail. A crop failure area may be declared in any province when the average yield over a specified area is less than 5 bushels per acre irrespective of the price of wheat.

Under the National Emergency section of the Act all townships whose average yields are twelve bushels or less are classified into three divisions according to their average yields. The first group is composed of those townships whose average yield is more than eight and not more than twelve bushels to the acre. The bonus payable on eligible acreage in these townships is ten cents per acre for every cent not exceeding ten by which the average price is less than eighty cents. The maximum payable under this section is then one dollar per acre. Since one half of the cultivated acreage of each operator, not exceeding two

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(1) i.e. the average of the daily closing prices of Manitoba Northern No. 1 wheat in store, Fort William between July 31 and November 1 of the year in question.

hundred acres is eligible for bonus the maximum sum which any operator whose yield falls within this range may receive is $200.

If the average yield within the township is more than four and not more than eight bushels to the acre the award is fixed at one dollar and fifty cents, per acre. The maximum sum payable to any operator the yield in whose township falls within this range is $300.

If the average yield of wheat within the township is not more than four bushels to the acre the award is fixed at two dollars per acre. The maximum sum then which is payable to any operator the average yield for whose township falls within this range is $400.

The Act itself specified that for the purposes of the act 1939 should be considered an emergency year.

The "Crop Failure Assistance" section of the act provides for the declaration of a provincial crop failure area by the Governor-in-Council. Such an area may be declared in any of the three provinces when the average yield is five bushels to the acre or less in a minimum of 135 townships in Saskatchewan and 100 townships in Manitoba and Alberta respectively. The operators within qualified townships are to receive either $2.50 per acre for eligible acreage or a flat sum of $200 whichever is the greater. Hence the range

of payments under this section will be from $200 - $500 since eligible acreage is defined in the same way as in the National Emergency section. No farmer is eligible for assistance under both sections during one and the same year.

In partial support of this scheme a levy of one per cent is made on the net purchase price of all grain purchased by elevator companies and grain dealers in the three prairie provinces. Whenever the fund established by the collection of this one per centum levy is insufficient to pay the awards which are payable under the Act, an advance sufficient to cover this deficit is to be made from the Consolidated Revenue Fund. This "advance" is to be repayable without interest at such time as the Prairie Farm Emergency Fund has sufficient funds to cover this advance.

CHAPTER IV

SOME PREREQUISITES OF A SUITABLE BONUSING SCHEME

The Prairie Farm Assistance Act is designed to assist an industry affected by adverse conditions of production and of demand for its product over a period of difficulty. It is drafted upon the implicit premise that the individual farmer's need is directly dependent upon his average yield during any one particular crop year. The amount of assistance then awarded depends upon this average yield and also upon the price of wheat. That such a measure of need may not correspond to actual conditions as closely as might be considered desirable is not denied. Our purpose is not, however, to discover a more suitable measure of need. It is rather to discover a more equitable way in which to award a bonus which is graduated according to "need" as that condition is conceived of by the authors of the P. F. A. A.

This legislation provides a much more effective means of bonusing wheat producers in proportion to need, as that term is defined for our purposes, than any legislation which has preceded it. That it does not do so exactly is because of the diversity in the quality of the land and hence in the

size of individual average yields within any one township. If all farmers located within any particular township received the same average yield such legislation as the P.F.A.A. would be capable of awarding as bonus a sum graduated in proportion to need in individual cases.

I think it will be admitted that, other things being equal, yield varies fairly closely with the quality of the land from which it is derived. An inspection of the land class map of the Special Areas shows that marginal or super marginal wheat land occurs only in very small blocks within these Areas. Owing among other factors to differences in soil types, topography, and degree of stoniness or erosion, the quarters within any one township classified according to their suitability for wheat production, frequently range all the way from submarginal to good wheat land. The result is that those townships in which marginal or super marginal wheat land occurs are composed of two and frequently more than two classes of land.

Table VIIshows the number of land classes which appear in the various townships of the Special Areas. It will be noted that in the Tilley East and Berry Creek Areas there is a relatively large number of townships which are composed of only one land class. Such townships are composed of sub-

TABLE VI

SINGLE LAND CLASS COMPOSITION OF COMPLETE TOWNSHIPS OF THE ALBERTA SPECIAL AREAS.

Area	Twps. 90-100% one land class	Twps. 80-90%	Twps. 70-80%	Twps. 60-70%	Twps. 50-60%	Twps. 40-50%	Twps. less than 40%	Total Complet Twps.
Tilley East	60	9	7	3	6	2	1	88
Neutral Hills	10	4	9	9	4	8	2	46
Bow West	8	1	3	5	6	4	2	29
Berry Creek	32	6	5	0	0	0	0	43
Sullivan Lake	15	4	5	4	2	1	3	34
Sounding Creek	16	22	13	11	7	4	0	71

marginal land entirely, and much of this land remains uncultivated. Where such land is uncultivated its uniformity is of no significance for bonusing purposes. It is regretted that a map showing cultivated acreage for these areas is not as yet available.

The proportion of townships composed of more than two land classes is higher in the better areas. This is particularly noticeable in the Neutral Hills Area. In many of the more humid districts of Southern Alberta it is expected that this diversity in the quality of the land per township will be at least as great as for this Neutral Hills Area.

While this table gives the number of different land classes which appear in the townships of the Special Areas it does not indicate the proportion in which these land classes appear in the various townships. In an extreme case a township might be composed of four land classes and yet have 141 quarters of the same land class. Table VI was compiled in an effort to compensate for this shortcoming of Table VII. In this latter table is given the number of townships which are composed of varying amounts of any one land class, irrespective of which that land class may be. The presence of uncultivated submarginal land in the Tilley East and Berry Creek Areas again distorts the picture indicating a greater

TABLE VII

DISTRIBUTION OF LAND CLASSES PER COMPLETE TOWNSHIP IN THE ALBERTA SPECIAL AREAS

Area	Twps. Composed of one Land Class only	Twps. Composed of two Land Classes	Twps. Composed of three Land Classes	Twps. Composed of four Land Classes	Total No. of complete Twps.
Tilley East	47	31	10	0	88
Neutral Hills	2	11	28	5	46
Bow West	4	12	4	9	29
Berry Creek	19	19	4	1	43
Sullivan Lake	7	17	8	2	34
Sounding Creek	8	49	6	8	71

degree of uniformity than is significant for bonusing purposes. This table again should be used in conjunction with a map showing cultivated acreage.

Assuming that average yield varies fairly closely with the quality of the land from which it is derived and bearing in mind the diversity in quality of the land per township as indicated by the above tables the dispersion of average farm unit yields from the average yield for the township would appear to be considerable. This dispersion will however, be reduced in direct proportion as the relative distribution of land classes in each farm unit approaches the relative distribution of land classes in the township as a whole.

The greater the dispersion of the population of farm unit yields about the average yield for the entire township the greater will be the number of operators within that township who are "incorrectly" bonused.(1) It is for this reason that we have, later in this thesis, used certain measures of dispersion as a test of the suitability of the land class and the soil type as bases for bonusing schemes.

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(1) Those operators whose average farm unit yield falls within the same range as does the township average yield are, according to our definition of need, said to be "correctly" bonused.

Under the present method of awarding an acreage bonus the assumed (1) relatively high dispersion of average farm unit yields from the township average causes certain operators to receive an amount of bonus other than that which they should receive if assistance were graduated in accordance with need as we have so defined that condition. The average of the yields of all cultivated land within the township is taken as the determinant of the amount of bonus per acre which the operators within that township shall receive or indeed of whether or not they shall receive any bonus whatsoever.

Within the meaning of the "Emergency Year" Section of the P. F .A. A. the farmers resident within any particular township receive $2.00 per acre, $1.50, $1.00 or nothing as bonus according as the average yield for the township is less than 4.1, between 4.1 and 8.1 or greater than 12.1 bushels per acre. The discrepancy between the bonus which should be awarded and the actual amount of bonus received by the various operators is illustrated by the following case history. Since these yields are those recorded for the year 1933, no bonus was paid to these operators; no such

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(1) Data on yield dispersion which is presented later in this report is for each Special Area and not a township unit.

legislation being in effect at that time. These yields are from Twp. 17, R. 1, which is in the Tilley East Area. The soils are classified as loam and clay loam. The land within the township varies greatly in quality as is shown by the fact that the land within this township falls into three land classes as determined by the Economics Division: sub-marginal, marginal and fair wheat land.

TABLE VIII

AVERAGE YIELDS FOR 18 OPERATORS FOR 1933 IN TWP. 17, R. 1.

Yield	Number
1	2
2	1
5	2
6	1
8	2
9	4
10	3
11	1
20	1
25	1
	18

At the time these records were taken, July 1938, the operators resident within this township numbered 32. Nothing is known as to the number resident in the township in 1933. However, of the 32 resident there in 1938, 18 gave yield estimates for the year 1933. These 18 estimates appear in the above table.

The average yield for the township computed from these estimates is 8.78 bushels per acre. Under the present legislation all operators within this township would receive the bonus specified for this range, namely 10¢ per acre for every cent by which the average price is less than 80¢, a maximum of $1.00 per acre. However, there are eight of these eighteen operators who had an average yield of 8 bushels or less. Had it not been for the higher yields of the other 10 operators all eight would have received $1.50 per acre and if grouped by themselves 3 operators would have received $2.00 per acre since the average yield of these three was 4 bushels or less. On the other hand, there were two operators with average yields of 20 and 25 bushels per acre respectively who received the same bonus per acre as those operators whose average yield was 1 or 2 bushels per acre.

In this illustration these three operators whose average yield was four bushels or less might have lost a possible maximum of $400 and certaihly $200 providing one half their cultivated acreage reached the allowable maximum of 200 acres. Five other operators whose average yield fell between 4 and 8.1 bushels per acre would lose an amount ranging from $100 to $200. The amount of bonus

payable to those operators whose average yield falls between eight and twelve bushels to the acre depends upon the price of wheat whereas this is not the case with the other ranges. If then an operator whose average yield falls below 8 bushels per acre is placed within the range 8-12 bushels because of the higher yield of other operators in the township he is forced to bear the risk of a lower bonus because of this factor. This is the figure given for the upper limit of the range of loss in the above illustration.

In the above example there were eight of the eighteen or 44.4% of the operators who were correctly classified. There were eight operators or 44.4% of the total who received too low a rate of bonus and 2 operators or 11.2% who received too high a rate of bonus. Assuming then that those operators whose average yield falls within the range specified for the township are correctly bonused there are 55.6% of the operators correctly bonused and 44.4% incorrectly bonused in this township.

The defect then of the P. F. A. A. is that it does not "correctly" bonus operators according to the standard of need upon which it is itself based. The simple area method of grouping by township which it employs does not group operators according to their average yield. Those operators resident within the same township who got relatively high

yields will receive the same rate of bonus per acre as those operators who receive relatively low yields providing of course their township qualifies for a bonus. Such a method of awarding a bonus is obviously inequitable.

This defect of the present bonusing legislation did not pass unnoticed in the House of Commons even before the Bill was passed. Mr. Victor Quelch, the member for Acadia, which constituency is mostly within the Alberta Special Areas put this question to Mr. Gardiner in the House on May 10, 1939, "Some farmers may be on heavy clay soils and others on light soils. Six per cent of the land may be heavy and forty per cent light; and on the six per cent heavy land the average yield would be, say, twenty bushels to the acre, while on the lighter soil it might be five bushels to the acre. Will any allowance be made for that?"(1)

Mr. Quelch is here assuming that differences in soils is the only factor which may cause differences in yields within the township. Differences in soil type is an important factor but differences in topography, degree of stoniness, and conditions of erosion will also greatly affect yields. In answer to the above question, Mr. Gardiner made the following rather significant reply:

"When we have the records for all three provinces as we have now for Saskatchewan, it is possible that the proper thing to do would be what they are attempting to do in certain parts of the United States, that is, instead of working on the basis of townships, work on the basis of

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(1) Hansard p 4102.

soil condition areas. When one flies over the west in a plane today, one can see the bounds of these areas underneath, if one knows the nature of the soil; and that whole country can be mapped, as it is being mapped today by photographers in aeroplanes. We can eventually do that, but we have not that information now. So the township is the best possible basis to work on to get our principles established".(1)

Mr. Gardiner, aware of the inequalities which would result from a township basis for an acreage bonus suggests the possibility of working on "the basis of soil condition areas". To do this however he admits that the government must be in possession of more information than it was at the time at which he was speaking. The desideratum is a method of selecting and grouping those operators whose average yields during any one year are approximately the same. Such a method of grouping must not only be such as to correctly bonus a large percentage of the operators included within any group but it must also be administratively feasible.

The amount of administrative machinery required to operate any method of grouping must be taken into consideration. The administrative cost should of course constitute as small a part of the total cost of the bonus as possible. This factor rules out such suggested methods as grouping operators upon the basis of one half a township or bonusing

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(1) Hansard p 4102.

each individual operator according to his average yield or financial condition.

This factor as well as the percentage of operators correctly bonused must be considered in assessing the worth of an alternative method of bonusing. In the following chapter we propose to examine the land class as a possible basis for an acreage bonus.

CHAPTER V

THE LAND CLASS AS A BASIS FOR AN ACREAGE BONUS

The Economics Division of the Dominion Department of Agriculture is engaged in classifying agricultural land in the provinces of Saskatchewan and Alberta according to its suitability for wheat production. While the primary purpose of this survey is to provide a guide for the utilization of such lands the results may well be put to other uses. It is our purpose to examine the possibility of using the land class as the basis upon which to award an acreage bonus. By using it as the "basis" for a system of acreage bonusing we mean that the operators resident and farming on any land class within suitable boundaries be grouped together for purposes of bonusing. Such suitable boundaries might be those of a municipality or some more extended natural or political lines of demarcation.

The agricultural land in our area of reference, Census Divisions I - VI inclusive, varies greatly in quality, both in respect to the climatic conditions of the region in which it is situated and in respect to its own physical characteristics. These climatic and physical conditions are closely reflected in the suitability of the land itself for the production of wheat.

MAJOR SOIL BELTS OF SOUTHERN ALBERTA

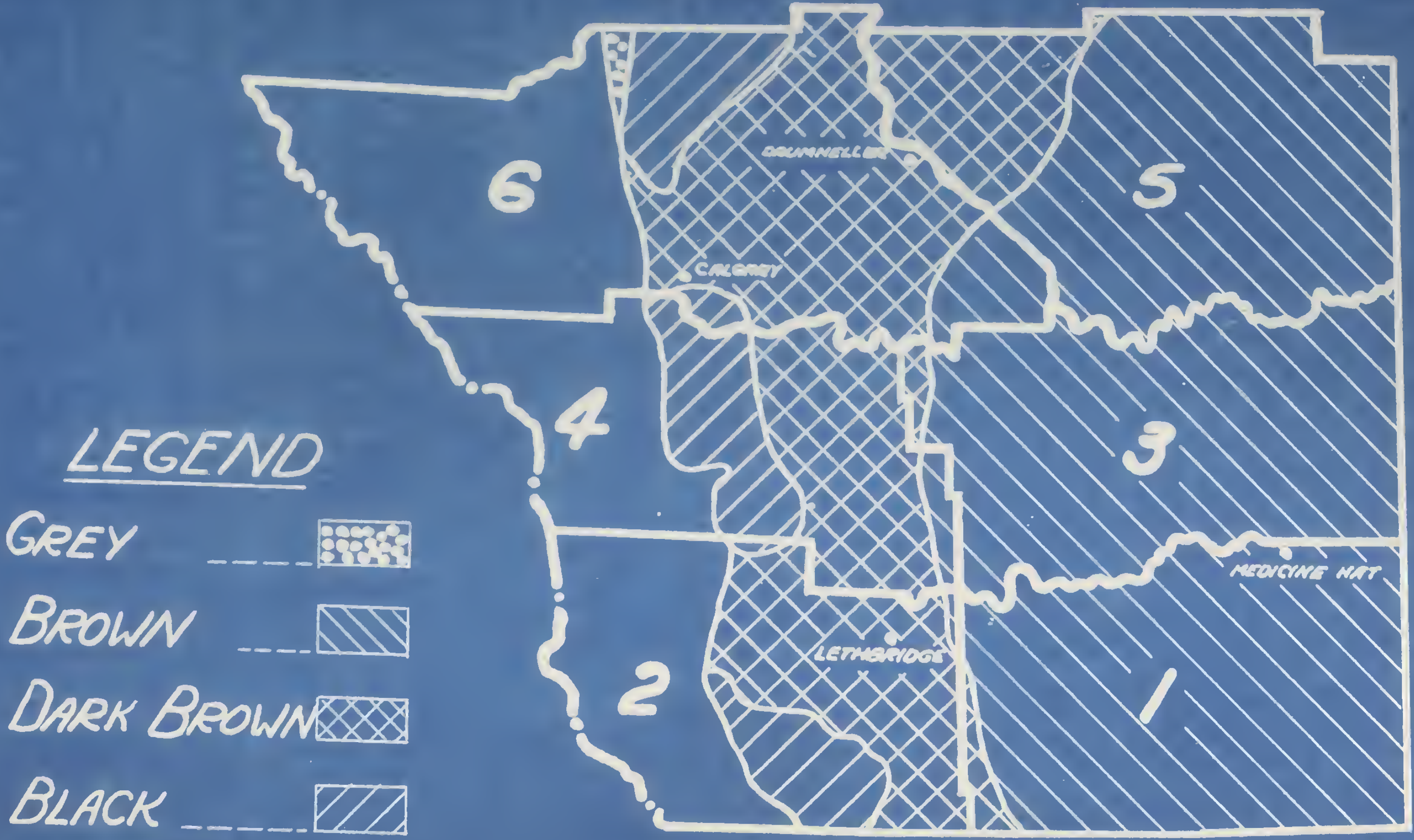

PLATE II

The larger proportion of the cultivable land within these six Census Divisions falls into the light brown soil zone. The name refers to the color of the surface soil, a color which is largely due to the comparative lack of organic matter in the soil. The native vegetation of the area is one of short grass. The soils of this area are fairly fertile but due to the characteristic lack of moisture only the heavier soils are suitable for the production of wheat. This is so not only because of the lack of rainfall but also because of its extreme fluctuations both from year to year and also in its distribution during any one year.

In years when the amount of precipation is relatively high, many of the soils of the area will yield heavily but the variable nature of conditions of high and low procipitation and evaporation render farming within this area an extremely hazardous undertaking. In rating arable acreage this factor must always be kept in mind. The boundaries of this light brown soil zone roughly coincide with those of Census Divisions I, III, and V. The highly variable nature of the yields within this zone is evident from the yield data given in Chapter II.(1)

The second largest soil zone in this area of reference is the dark brown steppe. As might be expected its surface

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(1) See above p 11.

AVERAGE ANNUAL TOTAL PRECIPITATION
IN INCHES

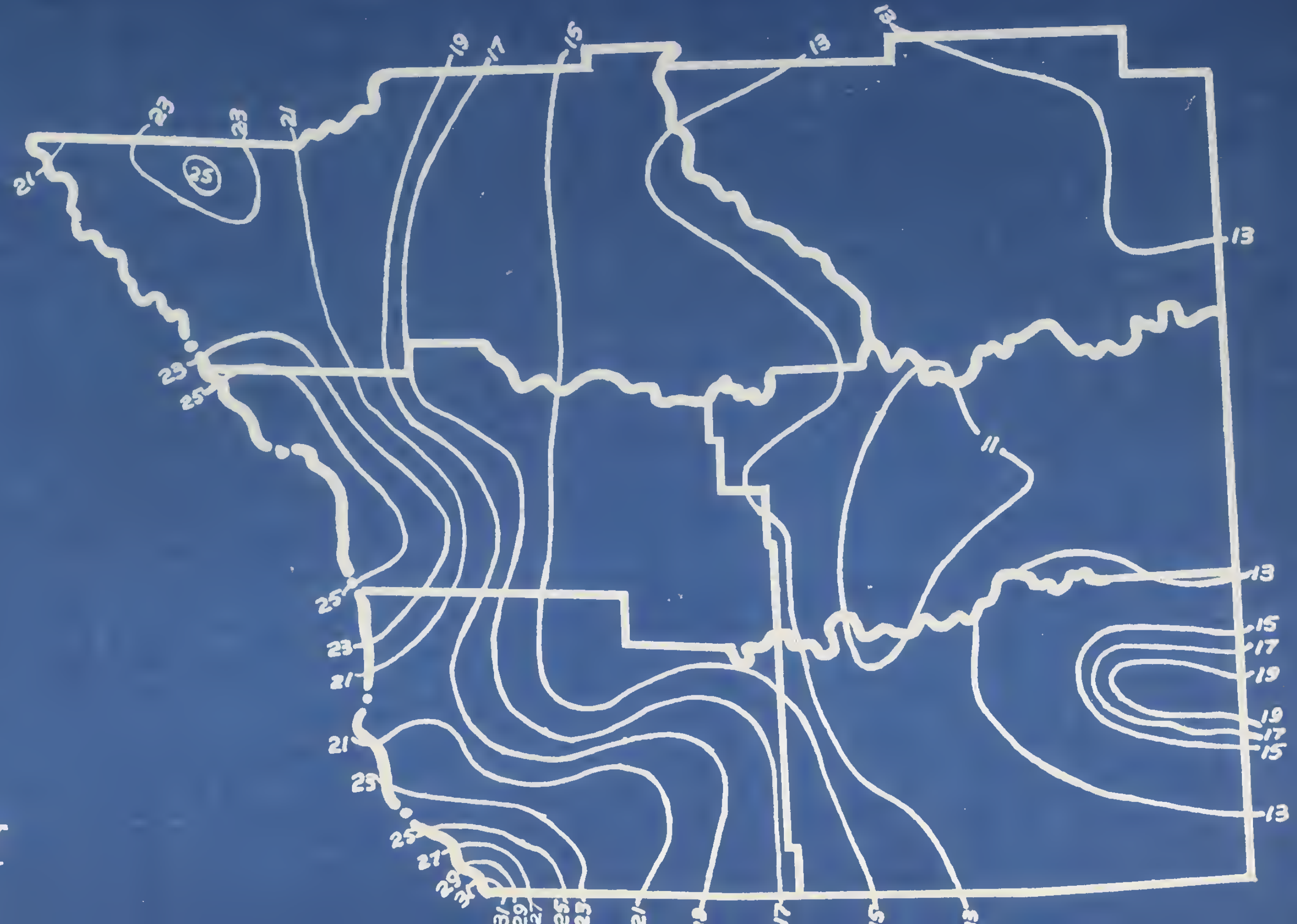


PLATE III

is of a darker color and the lime carbonate layer is lower in the soil profile, the organic content is higher and in its natural state the area is characterized by a heavier growth of grass vegetation. The soils of this zone are remarkably suited to the production of high protein wheat. The precipitation of this zone is more adequate and less variable than that of the light brown soil zone but periodic droughts and crop failures are all too common. Under methods of dry land farming yields vary greatly both from year to year and as among different farm operators during any one crop year.

Within this area of reference there is also a smaller area falling within the black earth soil zone. The surface soils of these areas are dark in color due to their high organic content, the lime carbonate is lower in the soil profile and in their natural state these soils support a species of tall prairie grass. The precipitation in these areas is greater, more favorably distributed throughout the year and somewhat less highly variable from year to year. These soils, subject to more favorable climatic conditions, are better suited to the production of cereal grains than either of the other two soil zones. The following two rough maps showing the boundaries of these respective soil zones and the long time average annual precipitation within

them gives some idea of the distribution of these soil zones and the precipitation conditions prevailing within them.

Within these major soil belts there are of course great variations in soil type and other physical characteristics together with minor regional climatic differences. Soils differ in fertility, availability of plant food, degree of levelness, water absorbing and water holding capacity, number of stones, tendency to erode and other factors. If an acreage bonus is to be awarded upon a single basis that basis must take all these and other factors into account and weight them according to their relative importance. Such a basis must be uniform throughout the area and it must be clearly defined. Do the land classes as they are presently being determined by the Economics Division meet this qualification? These land classes are based upon the probable net revenue of the land in question when used for purposes of wheat production. The margin is determined by a budget which is based upon prices for the product and costs of production over a period of time. The marginal land class is not, strictly speaking, one quality of land, but covers a range as does each of the other three land classes. All parcels of land are graded upon the basis of a number of factors according to their capacity to produce wheat and placed in one of the four land classes. The location of the eight and one

half million acres in which a final land classification has been completed appears in the map on Plate IV. Following this is a photograph of the final land class map of the six Alberta Special Areas.

The suitability of these various lands for wheat production is based upon physical, meteorological and economic factors. The first include soil type, topography, degree of stoniness and conditions of erosion. The second the amount and distribution of the annual rainfall, temperature and evaporation conditions, and length of the growing season. The third includes such factors as distance from the railroad and distance from retail centres.

The position of the margin does not concern us directly in this thesis. What we are concerned with is this: "How closely does the uniformity in the quality of the land as found in each land class reflect itself in uniformity of average yields within these respective land classes for any one crop year?" If a comparatively uniform type of land gives approximately the same wheat yields, during any one year there is some case for a bonus on a land class in preference to a township basis. In Chapter VI statistical data are presented to indicate the extent to which the uni-

formity in the quality of the land within any one land class reflects itself in the uniformity of annual average yields derived from this land.

ECONOMIC SURVEY AREAS
IN
ALBERTA

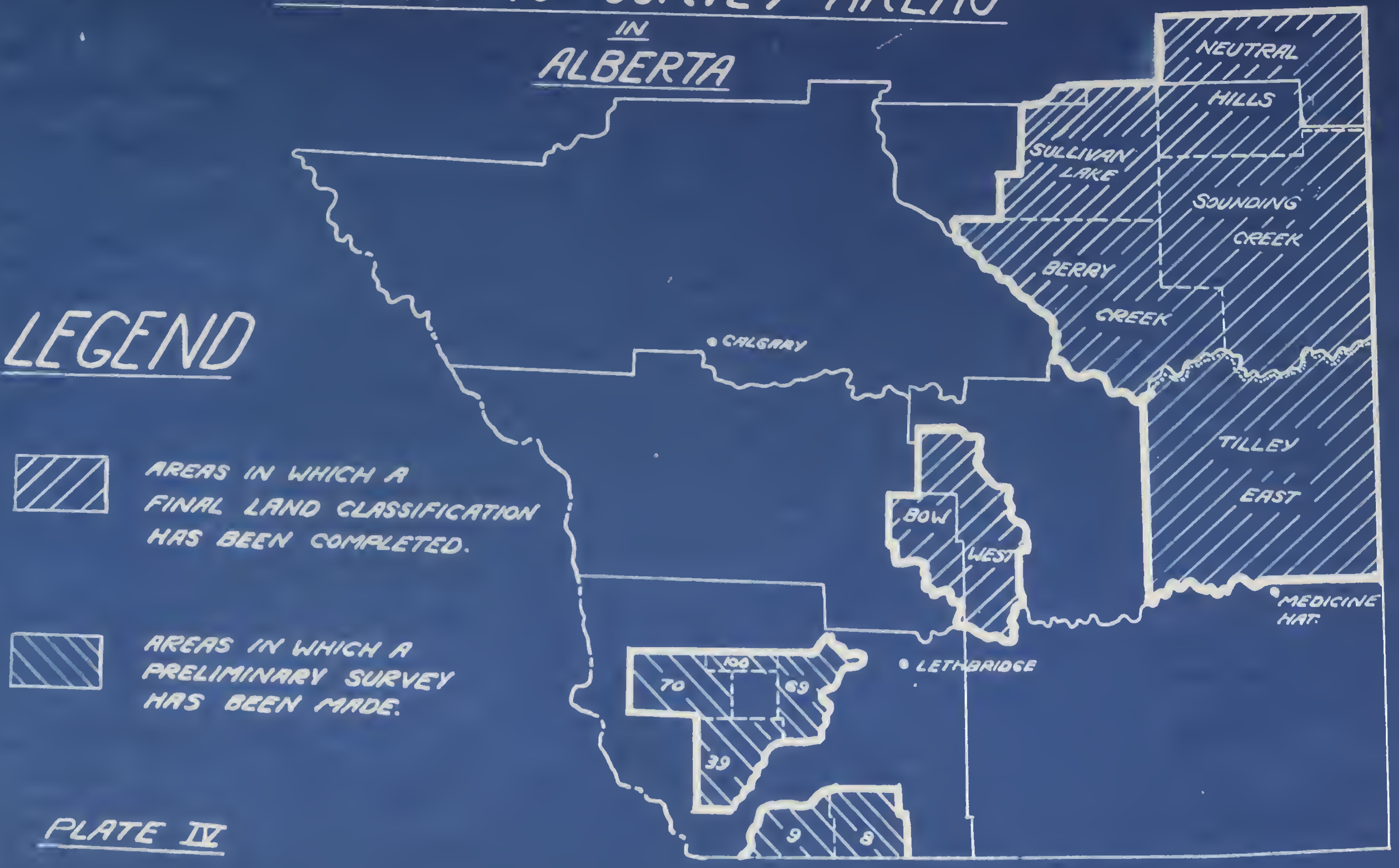
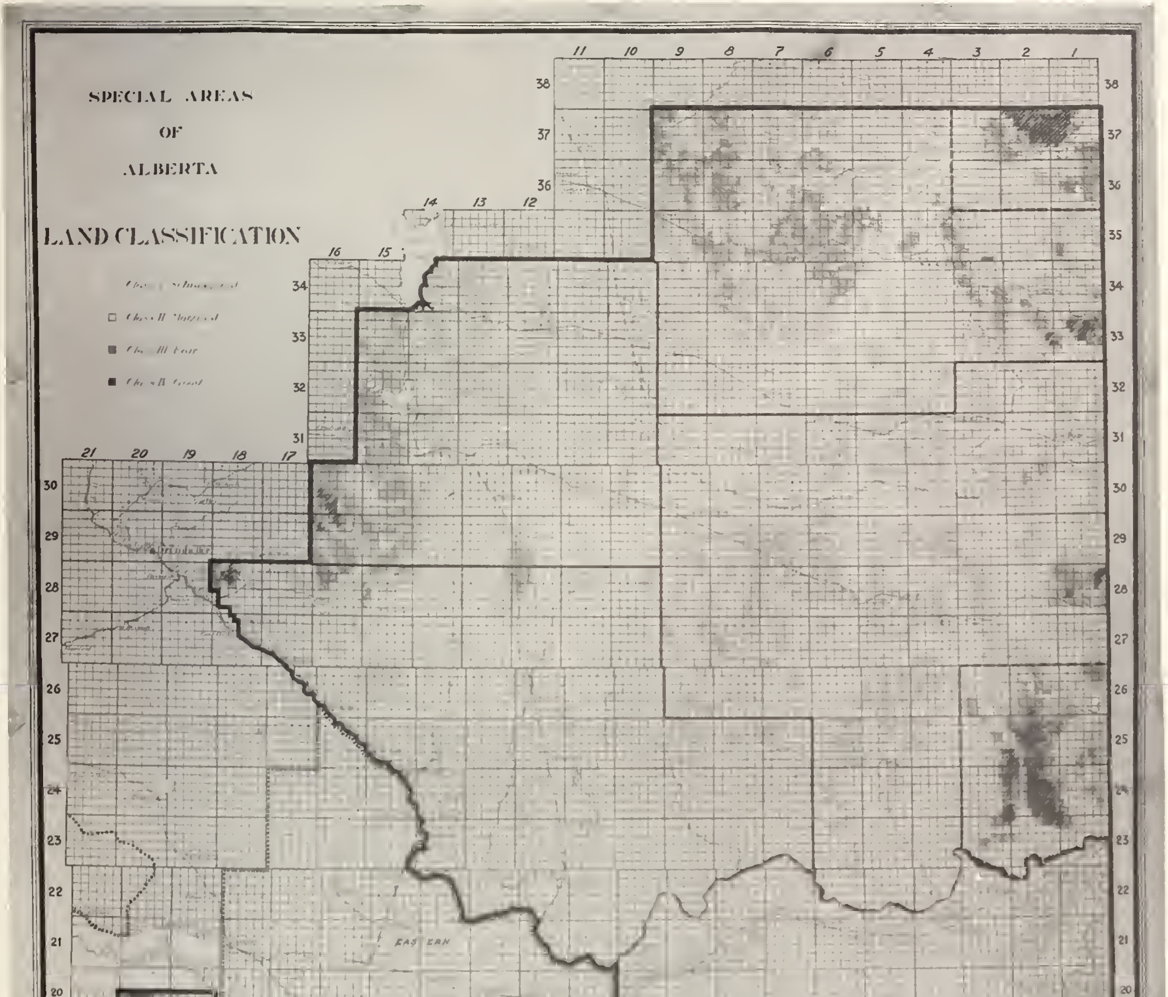


PLATE IV

PLATE V


SPECIAL AREAS
OF
ALBERTA
LAND CLASSIFICATION
Class I Submarginal
☐ Class II Marginal
■ Class III Fair
■ Class IV Good
EASTERN
IRRIGATION
DISTRICT
C.L.
AND
IRR.
CANADA
LAND
AND
IRRIGATION
LETHBRIDGE
NORTHERN I.D.
C.P.R.
LETHBRIDGE
SECTION
Drumheller
LAND UTILIZATION SURVEY

CHAPTER VI

YIELD CHARACTERISTICS OF THE VARIOUS LAND CLASSES

Data were presented in Chapter IV to indicate the diversity in quality of the land within the various townships of the Special Areas. (1) There it was argued that if yield varied "fairly closely" with the quality of the land from which it was derived this diversity in the quality of the land would reflect itself in diversity of average yield. In that chapter however no data were given to show how closely this correlation between average yield and land quality held. Tables IX to XVI which are appended to this chapter give the average wheat yields by land classes for four of the six Alberta Special Areas. These Areas are Neutral Hills, Sullivan Lake, Tilley East and Bow West. The period for which these yields are given is from 1921-1936.

Tables IX to XII give the average yield for each land class for each year of this period together with the number of estimates from which it has been calculated. These estimates were secured by enumerators who contacted the farmers in these areas. Since these estimates are of average yields from each farm unit it is necessary to classify the records according

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(1) See Tables VI and VII, pages 32 and 34.

to the predominant land class of the cultivated land in the farm from which they are taken. In order to get a sufficiently large sample it was impossible to discard those records of farm units which were composed of more than one land class. There are relatively few farm units the total cultivated land of which falls entirely within one land class. By discarding all but these the size of the sample would have been diminished to such an extent as to render it unlikely that such a sample would be representative of the total actual yields on any particular land class.

Consequently yield records were classified according to the land class in which the greater part of the cultivated acreage fell. The date of acquisition of the various parcels in the farm unit in relation to the yield record was also kept in mind in making a classification. No record was selected if the cultivated land belonged to more than two land classes or even to two unless these two were adjacent or successive classes. That is, if a farm unit is composed of land belonging to land classes I and III, II and IV or I and IV its record was discarded. It is apparent that this method of classifying farm yield records will reduce any difference which there may be in average yields which are derived from different land classes.

Another factor which tends to diminish this difference in average yields as between land classes is one which is inherent in the method of classification itself. Quarters, the soil of which is of a heavier texture, are sometimes discounted because of the small acreage arable per quarter. The soil on a particular parcel may be such as to warrant its being classified as III or IV providing the whole quarter is arable. If, however, there are only thirty acres arable, this quarter will probably be placed in Class I, rather than in Class III or Class IV. This low arability will of course have no effect upon the average yield from the arable and cultivated portion of the quarter. Such yields from quarters with low arability but heavy soils may well be as high as the average yield on Class III or Class IV land.

This last factor will tend to increase the average yield for land classes I, II, and III and hence to diminish the difference in average yield between Classes III and IV. It may not however decrease the difference in average yields between land Classes I and II and II and III. Whether it does so or not will depend upon the relative number of quarters discounted into each of the three lower land classes and also upon the relative quality of the soils and the other physical characteristics of these various quarters which have been so discounted. The yield data which we have classified as being

derived from each of the various land classes are not then strictly speaking derived from a particular land class. In most cases such yield data are from two land classes but in this joint origin one class is predominant. It is regretted that "pure" yield data from each land class could not be obtained but such was not available.

Tables XIII to XVI summarize the data which were given in Tables IX to XI. The first four tables gave the average annual yield for each land class for each year. These latter four tables give the period average of these average annual yields for three periods, 1921-1936, 1929-1936, and 1921-1928. The averages for these latter two periods are given since the first 1921-1928 was an exceptionally favorable one for the growing of wheat while the second 1929-1936 was exceptionally unfavorable. The same relationship which appears between land class and average yield for the entire period held for these two shorter and very dissimilar periods.

These latter four tables indicate a certain relationship between land class and average yield. For each of the three periods for which the average has been computed we find the yield for each of three better land classes to be consistently higher than for the immediately preceding and inferior land class. That is the average yield for Class II is higher than for Class I, for Class III higher than for Class II and

so on. This relationship holds for each of the four Areas with a single exception in Bow West where the average yield for the period 1929-1936 is the same for Classes I and II.

These data would indicate then that there is a degree of correlation between the quality of the land and its annual average yield. The better land quite consistently exhibits the higher yield. As may be seen from Tables IX to XII this relationship holds fairly consistently for single years while taking the period averages as was done in Tables XIII to XVI there appeared only one exception and this was for a dry period of years during which the average yields for marginal and submarginal lands were equal. The average yield for the entire area is usually approximately the same as the average yield for land class II.

This correlation of yield and the quality of the land from which it is derived substantiates the argument which we made in Chapter IV. There we indicated the diversity in quality of the land per township in the Alberta Special Areas and assumed that yields from these different qualities of land would also differ. These yield records for different land classes shows that yield does vary with the quality of the land from which it is derived. We infer then that average yields from different land classes within a township will differ among themselves and from their own average.

Such being the case operators located on these various land classes and classified for bonusing purposes according to the average yield for the township will be incorrectly bonused.

TABLE [illegible]

AVERAGE WHEAT YIELDS BY LAND CLASSES FOR THE NEUTRAL HILLS SPECIAL AREA 1921-1936

YEAR	CLASS I		CLASS II		CLASS III		CLASS IV		ENTIRE AREA	
	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates	Bus.
1936	208	1.3	236	1.5	208	2.1	28	2.0	686	1.6
1935	182	2.9	215	3.2	195	4.3	25	4.0	617	3.5
1934	144	2.6	192	3.3	165	5.1	22	4.9	523	3.8
1933	130	3.6	161	4.0	146	6.4	20	7.5	457	4.9
1932	116	10.6	159	12.3	148	15.2	25	22.6	448	13.4
1931	99	6.4	146	7.8	136	11.6	19	17.5	400	9.2
1930	105	14.4	155	14.7	138	17.6	21	15.3	419	15.6
1929	94	3.2	134	4.2	131	5.6	22	4.7	381	4.5
1928	92	17.9	136	15.8	130	17.8	22	23.4	380	17.4
1927	86	21.0	123	24.2	120	26.9	21	31.0	350	25.[illegible]
1926	72	10.0	97	12.1	91	13.1	15	9.7	274	11.0
1925	63	17.0	90	10.3	93	20.3	13	21.1	259	19.0
1924	57	3.0	85	4.5	92	5.4	13	5.8	257	4.5
1923	67	24.1	86	26.3	93	27.6	15	27.2	261	26.4
1922	58	5.5	67	9.4	75	12.8	9	24.9	209	10.3
1921	55	[illegible]	62	10.5	74	10.6	8	17.5	199	13.1

TABLE X

AVERAGE WHEAT YIELDS BY LAND CLASSES FOR THE SULLIVAN LAKE SPECIAL AREA 1921-1936

YEAR	CLASS I		CLASS II		CLASS III		CLASS IV		ENTIRE AREA	
	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates	Bus.
1936	208	1.4	161	2.0	80	2.2	9	5.3	458	1.8
1935	206	7.6	155	10.0	72	13.7	9	25.3	442	9.8
1934	185	2.1	135	2.8	65	4.2	8	8.5	393	2.8
1933	165	2.2	124	3.2	55	4.5	8	7.3	352	3.0
1932	168	11.1	126	14.4	61	15.6	8	24.1	363	13.3
1931	141	3.0	116	4.1	51	5.5	7	7.1	315	3.9
1930	139	6.0	106	6.3	48	7.1	7	10.3	300	6.4
1929	132	3.1	107	4.8	49	6.3	7	6.7	295	4.3
1928	123	13.8	107	16.9	49	21.6	7	21.0	286	16.4
1927	108	15.4	93	14.4	47	18.4	7	24.1	255	15.8
1926	91	12.1	80	15.2	41	17.1	7	16.7	219	14.3
1925	92	16.6	76	18.1	37	17.9	6	17.3	211	17.4
1924	87	3.3	69	4.5	43	5.9	7	11.6	206	4.5
1923	91	21.4	70	25.8	41	27.1	7	30.9	209	24.3
1922	71	6.1	61	7.0	32	8.8	6	13.3	170	7.2
1921	65	6.6	57	6.6	31	6.3	6	8.7	159	6.6

TABLE XI

AVERAGE WHEAT YIELDS BY LAND CLASSES FOR THE TILLEY EAST SPECIAL AREA 1921-1936

YEAR	CLASS I		CLASS II		CLASS III		ENTIRE AREA	
	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates	Bus.
1936	147	2.2	149	2.4	71	3.1	367	2.5
1935	147	5.1	146	6.1	73	6.6	366	5.8
1934	136	3.4	140	4.1	66	5.2	342	4.1
1933	128	4.0	126	5.6	59	8.3	313	5.4
1932	138	12.1	135	13.7	65	15.8	338	13.5
1931	121	4.9	119	6.9	48	10.1	288	6.6
1930	117	5.6	110	6.1	48	11.3	275	6.8
1929	116	6.9	117	7.8	48	12.8	281	8.3
1928	108	23.2	124	27.5	53	30.7	285	26.5
1927	97	30.7	113	31.9	50	37.8	260	32.6
1926	75	6.9	92	7.7	37	7.6	204	7.4
1925	72	6.4	79	7.5	34	7.1	185	7.0
1924	71	3.1	76	3.5	35	4.1	182	3.5
1923	66	16.5	79	17.9	37	21.7	182	18.2
1922	52	7.5	67	8.2	23	10.1	142	8.3
1921	39	6.6	56	7.8	14	9.3	109	7.6

TABLE XII

AVERAGE WHEAT YIELDS BY LAND CLASSES FOR THE BOW WEST SPECIAL AREA 1921-1936

YEAR	CLASS I		CLASS II		CLASS III		CLASS IV		ENTIRE AREA	
	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates	Bus.	No. of Estimates.	Bus.
1936	35	1.66	51	4.02	25	3.84	17	5.00	128	3.47
1935	35	3.71	48	5.27	21	5.76	17	7.06	121	5.16
1934	32	3.56	44	6.25	18	6.89	17	8.94	111	6.00
1933	33	3.55	42	5.57	15	6.20	16	9.38	106	5.60
1932	32	10.09	48	10.25	22	16.23	17	18.06	119	12.43
1931	33	2.27	43	3.95	16	6.44	17	7.82	109	4.41
1930	31	4.58	42	7.33	15	8.47	15	10.20	103	7.09
1929	30	6.77	48	8.60	19	12.95	14	14.79	111	9.63
1928	32	21.47	50	29.68	23	30.52	14	31.29	119	27.82
1927	28	25.64	49	33.37	18	30.78	14	34.36	109	31.08
1926	24	8.25	40	10.22	14	21.79	13	18.92	91	12.72
1925	24	5.79	40	8.78	13	13.69	9	2.12	86	9.98
1924	22	2.41	39	3.41	12	8.58	7	8.57	80	4.36
1923	24	19.25	41	21.17	12	21.00	10	32.30	87	21.89
1922	19	3.79	38	6.20	10	7.90	7	10.43	74	6.24
1921	21	2.71	38	4.03	10	7.30	7	6.57	76	4.32

TABLE XIII

COMPARISON OF AVERAGE WHEAT YIELDS

1929-36, 1921-28 AND 1921-36

FOR THE NEUTRAL HILLS SPECIAL AREA

LAND CLASS	(1) AVERAGE ANNUAL YIELD 1921-1936	(2) AVERAGE ANNUAL YIELD 1929-1936	(3) AVERAGE ANNUAL YIELD 1921-1928
I	9.9	5.6	14.14
II	10.8	6.3	15.14
III	13.0	8.4	17.54
IV	14.4	9.8	19.08
TOTAL AREA	11.5	7.0	15.94

TABLE XIV

COMPARISON OF AVERAGE WHEAT YIELDS

1929-36, 1921-28 AND 1921-36

FOR THE SULLIVAN LAKE SPECIAL AREA

LAND CLASS	(1) AVERAGE ANNUAL YIELD 1921-1936	(2) AVERAGE ANNUAL YIELD 1929-1936	(3) AVERAGE ANNUAL YIELD 1921-1928
I	8.2	4.6	11.91
II	9.8	6.0	13.56
III	11.4	7.4	15.39
IV	14.7	11.8	17.95
TOTAL AREA	9.5	5.7	13.31

TABLE XV

COMPARISON OF AVERAGE WHEAT YIELDS

1929-36, 1921-28 AND 1921-36

FOR THE TILLEY EAST SPECIAL AREA

LAND CLASS	(1) AVERAGE ANNUAL YIELD 1921-1936	(2) AVERAGE ANNUAL YIELD 1929-1936	(3) AVERAGE ANNUAL YIELD 1921-1928
I	9.1	5.53	12.61
II	10.3	6.6	14.00
III	12.6	9.0	16.05
TOTAL AREA	10.3	6.6	13.89

TABLE XVI

COMPARISON OF AVERAGE WHEAT YIELDS

1929-36, 1921-28 AND 1921-36

FOR THE BOW WEST SPECIAL AREA

LAND CLASS	(1) AVERAGE ANNUAL YIELD 1921-1936	(2) AVERAGE ANNUAL YIELD 1929-1936	(3) AVERAGE ANNUAL YIELD 1921-1928
I	7.84	6.41	11.16
II	10.51	6.41	14.62
III	13.02	8.35	17.70
IV	14.11	10.16	18.07
TOTAL AREA	10.70	6.59	14.80

CHAPTER VII

THE LAND CLASS AS A METHOD OF GROUPING OPERATORS FOR PURPOSES OF BONUSING

We stated in Chapter IV that an essential prerequisite of a suitable bonusing scheme is a method of grouping operators which will permit of the "correct" bonusing of the members of that group. (1) In order that such a group may be correctly bonused their annual average yields must be approximately the same. In Chapter V it was stated that if a comparatively unifor type of land gives approximately the same wheat yield during any one year there is some case for a bonus on a land class in preference to a township basis. In this chapter we propose to determine how closely individual yields derived from land as uniform as that within each of our land classes approach each other in size.

We found in Chapter VI that there is a relationship between average annual yield and the land class from which it is derived. The average yields from the better land classes are higher. This fact suggests a possible method of segregating operators with higher yields from those with lower yields. We are concerned as well however with discovering how consistenly yields from the better classes of land

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(1) See above p 41.

are higher and how consistently yields from the poorer classes of land are lower. That is if for any one year the average yield on Class I land within a certain municipality is 10 bushels per acre we wish to know how close to 10 bushels the average yield of each operator is. In other words, how great is the dispersion of the population of individual average yields from each land class about the average of these averages. The less this dispersion the larger the proportion of operators who would be correctly bonused on a land class basis.

In an effort to test this degree of dispersion two measures of variability were computed for four different years for the Neutral Hills Special Area. The years selected were 1927, 1931, 1932 and 1933. Of these four years the first, 1927, was a very favorable year for the production of wheat, while the last, 1933, was exceptionally dry. The average yields for these two years were 15.0 and 4.8 bushels respectively. The years 1931 and 1932 were less extreme with the former the more unfavorable of the two. Their respective average yields were 9.2 and 13.4 bushels. The selection of four such years should give some indication of the variability of yields per land class for both "good" and "bad" years.

A limitation of our yield data which was explained in

Chapter VI (1) in connection with the differences in average yields as among different land classes is of significance in regard to the variability of average yields per land class from their average. Since yield estimates, which are classified as belonging to one land class only are usually from two we may expect our yield data to exhibit greater variability than is actually the case. Moreover we may expect considerable variability on Land Classes I and II for another reason. Here are to be found quarters with good heavy textured soils which have been graded down because of low arability per quarter. This is not however a defect in the method of collection of our yield data but is a characteristic inherent in our method of land classification. We admit that it constitutes a defect in the suitability of the land class as a basis for the grouping of operators for bonusing purposes.

Two measure of variation are given in each case, the standard deviation and the coefficient of variation. The former is an absolute and the latter a relative measure of dispersion. It must be remembered that with our definition of need it is actual deviation in bushels of individual farm unit yields from the group average, however the group may be selected, which determines whether or not any particular operator is correctly bonused.

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(1) See above p 50.

When evaluating these two measures of dispersion for our purposes this consideration should be given due attention. The same standard deviation on the higher land classes as on the lower will give a lower coefficient of variability for the former than for the latter. This relationship is attributable to the higher average yields characteristic of the better land classes.

Tables XVII to XX give the average yield, the standard deviation and the coefficient of variation for each land class and for all land classes taken together for the Neutral Hills Area for the four years mentioned. These two measures of variation are also computed for the entire area irrespective of the land class from which the yields are derived although the use of this latter figure is limited.

It must be remembered that the P. F. A. A. groups operators on a single township and not on the basis of an area as large as the Neutral Hills. Consequently a comparison of variability of yields per land class and variability of yields on the entire area as given in these tables does not constitute a comparison between grouping on a land class and on a township basis for bonusing purposes. To make such a comparison would necessitate working on a township basis and computing the percentage of operators "correctly" bonused under each method of grouping. The yield data available are not adequate to permit of such an analysis.

As regards the four tables appended to this chapter we find the average annual yield to vary consistently with the land class. There is little difference among the standard deviations for the various land classes. This factor would seem to indicate that the percentage of operators "correctly" bonused on each land class would be the same, if operators were bonused on a land class basis. The coefficient of variation varies inversely with the land class being lower for the better land classes. Since the standard deviations are approximately equal and the average yield varies directly with the land class this inverse variation for the coefficient of variation is what we should expect. This is so since the coefficient of variation is a relative measure of dispersion.

Assuming that an acreage bonus was paid only when average yields were sufficiently low to qualify under the present legislation no award would have been paid for the year 1927. In 1931 three of the four land classes in the Neutral Hills would have qualified for a bonus. Classes I and II would have received the same bonus and Class III by reason of its higher average yield a lower bonus. The operators on Class IV land would have for the same reason been excluded. In 1932 only the operators on Class I land would have received a bonus while in 1933 all land classes would again have qualified for an award. In this latter case the operators on

Classes I and II would have been bonused at a higher rate than operators on Classes III and IV.

In drawing the conclusions which we have in the preceding paragraph we have assumed that the P. F. A. A. was administered on a land class basis within the limits of the Neutral Hills Special Area. Whenever the average yield per acre on any land class within this area fell below a specified maximum, which the P. F. A. A. fixes at 12.1 bushels, then a bonus of a specified sum per acre should be paid to the operators farming this land. Additional provisos as to the maximum cultivated acreage farmed by any one operator upon which a bonus was payable could be made as is done at present.

It is thought that if a bonus could be awarded upon the basis of average yields on land classes within a municipality costs of administration would be greatly reduced from ~~that~~ what ~~which~~ they are at present. The average yield for each land class might be determined by sampling the crop prior to threshing rather than relying on farmers' returns. Since farm units are usually composed of several land classes it would be difficult to determine yield per land class from such returns by farm operators. The difficulties involved in determining yield per township by sampling methods would be lessened by sampling on a land class basis if on the whole average yields per land

proved to be more nearly uniform in size than those within the township.

A further advantage to be derived from bonusing on a land class basis would be the possibility of bonusing parcels of land rather than farm units as is being done by the P.F.A.A. In this way an operator whose farm is composed of varying qualities of land classified into different land classes might receive a bonus on some quarters and not on others. Such a method would represent a closer correlation between the size of average yield and the amount of the acreage bonus payable. This arrangement would also circumvent the difficulty experienced under the present arrangement of classifying operators who are farming land located in different townships the average yield in which differs sufficiently to cause them to receive different amounts of bonus.

It is possible then that the distribution of an acreage bonus upon a land class basis would be not only more equitable but also more economical than its distribution upon a township basis. The distribution of the bonus for the crop year 1939 in our area of reference is shown in the following photograph.(1) It is possible here to note how average yield as determined by the P.F.A.A. corresponds to the general distribution of land classes in this area. In the following chapter the possibility of bonusing on a soil type basis will be briefly examined.

(1) Information acquired by correspondence with Mr. S. Sinclair, Assistant Sup't. P. F. A. A., Regina, Saskatchewan.

PLATE VI

Distribution of the Acreage Bonus for the Crop Year 1939.

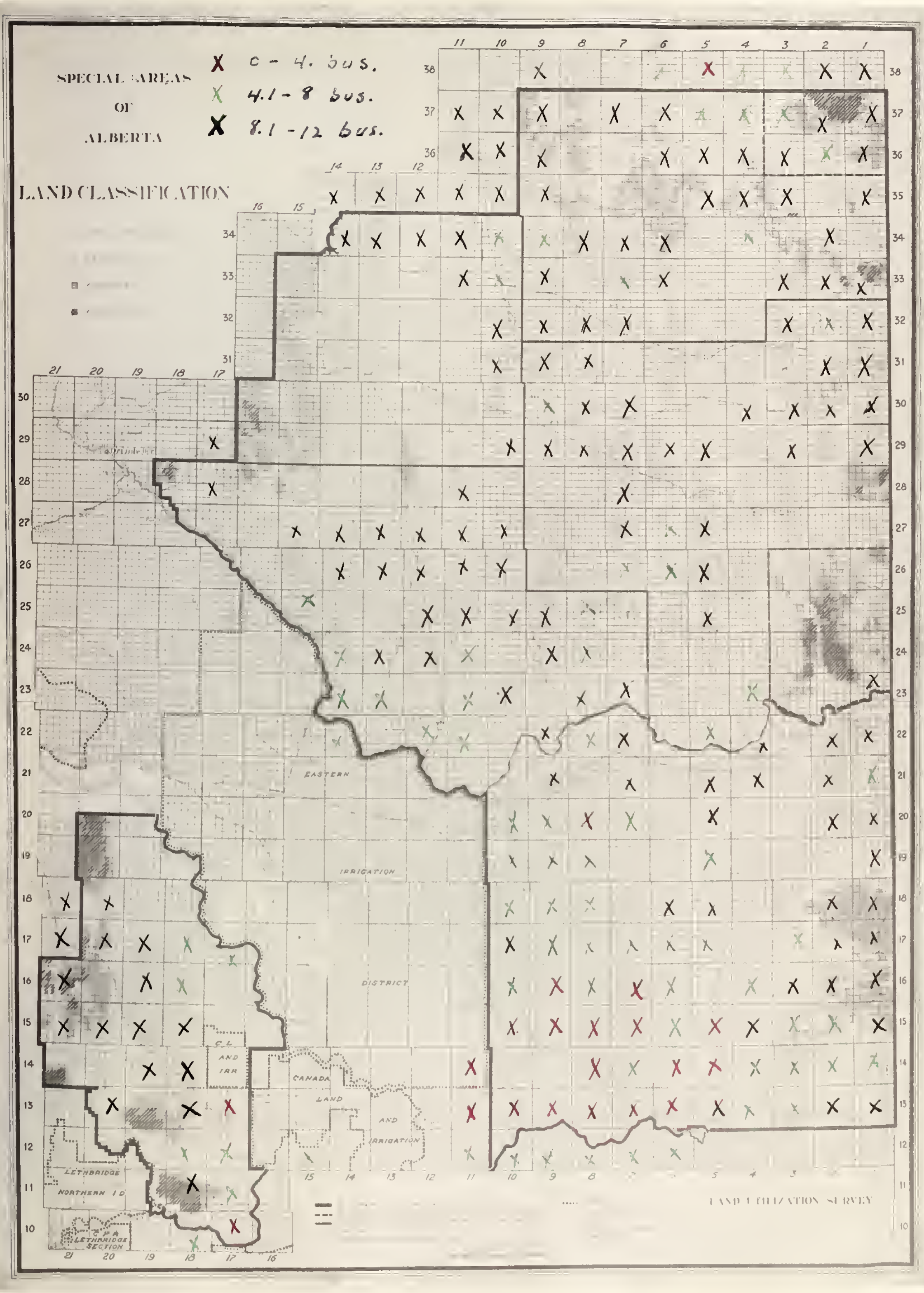

TABLE XVII

VARIABILITY OF WHEAT YIELDS BY LAND CLASSES

FOR THE NEUTRAL HILLS SPECIAL AREA FOR THE YEAR 1927

	LAND CLASS I	LAND CLASS II	LAND CLASS III	LAND CLASS IV	ALL CLASSES
Average Yield	21.8	24.2	26.9	31.0	25
Standard Deviation	9.7	8.4	7.4	10.6	8.9
Coefficient of Variation	44.4%	34.6%	27.6%	34.2%	35.7%

TABLE XVIII

VARIABILITY OF WHEAT YIELDS BY LAND CLASSES

FOR THE NEUTRAL HILLS SPECIAL AREA FOR THE YEAR 1931

	LAND CLASS I	LAND CLASS II	LAND CLASS III	LAND CLASS IV	ALL CLASSES
Average Yield	6.4	7.8	11.6	17.5	9.2
Standard Deviation	5.0	5.6	6.0	6.7	6.0
Coefficient of Variation	77.0%	73.0%	51.9%	38.1%	65.8%

TABLE XIX

VARIABILITY OF WHEAT YIELDS BY LAND CLASSES

FOR THE NEUTRAL HILLS SPECIAL AREA FOR THE YEAR 1932

	LAND CLASS I	LAND CLASS II	LAND CLASS III	LAND CLASS IV	ALL CLASSES
Average Yield	10.6	12.3	15.2	22.6	13.4
Standard Deviation	5.6	7.0	6.4	6.4	7.1
Coefficient of Variation	52.4%	56.6%	42.0%	28.2%	52.9%

TABLE XX

VARIABILITY OF WHEAT YIELDS BY LAND CLASSES

FOR THE NEUTRAL HILLS SPECIAL AREA FOR THE YEAR 1933

	LAND CLASS I	LAND CLASS II	LAND CLASS III	LAND CLASS IV	ALL CLASSES
Average Yield	3.6	4.0	6.4	7.5	4.8
Standard Deviation	3.7	2.8	4.1	3.8	3.89
Coefficient of Variation	92.8%	70.5%	57.6%	51.0%	76.0%

CHAPTER VIII

THE SOIL TYPE AS A METHOD OF GROUPING OPERATORS FOR PURPOSES OF BONUSING

An alternative to the land class as a method of grouping operators for bonusing purposes is the soil type. Soils differ markedly in their capacity to produce wheat. It is very possible that yields on any one soil type within a specified area may be sufficiently uniform in size to render the soil type a better basis for grouping operators than the township or even the land class. To investigate this possibility we propose to apply the same criterion which was used in Chapter VII, viz how closely do the average farm unit yields per soil type cluster about the average yield for that soil type?

Just as we observed definite consistent differences among long term average yields on the various land classes so too we find such differences among long term average yields on the various soil types. This is evident from Table XXI which gives the average wheat yields by soil type for the period 1921-1936 for the Neutral Hills Special Area together with the number of estimates from which each average was computed. This area lies partly in the light brown and partly in the

dark brown major soil belts. (1) The classification of soil type within these major soil belts is made according to the relative amounts of different sized particles found in the soil in question. Although two soils may be classified into the same type from the standpoint of size of particle these soils may differ considerably in chemical composition. Our classification takes no account of such chemical differences. The following photograph of a soils map of the Special Areas shows the distribution of the various soil types within these areas.

The yield data for Table XXI was collected by enumerators in the field and later classified according to the soil type on which each farm unit was located. Two soil types in each of the light brown and dark brown major soil belts were selected for analysis. The average yield for these four soil groups for each year for the period 1921-1936 is given in Table XXII. The number of estimates from which each of these averages is computed is also included in this table. Table XXIII gives the period average 1921-1936 for each of these soil types in each major soil zone; the average yields for the loams in each soil zone are higher than for the lighter textured sandy loams. There is also a difference between the average yields for soils of comparable texture in the light brown and dark brown soil zones.

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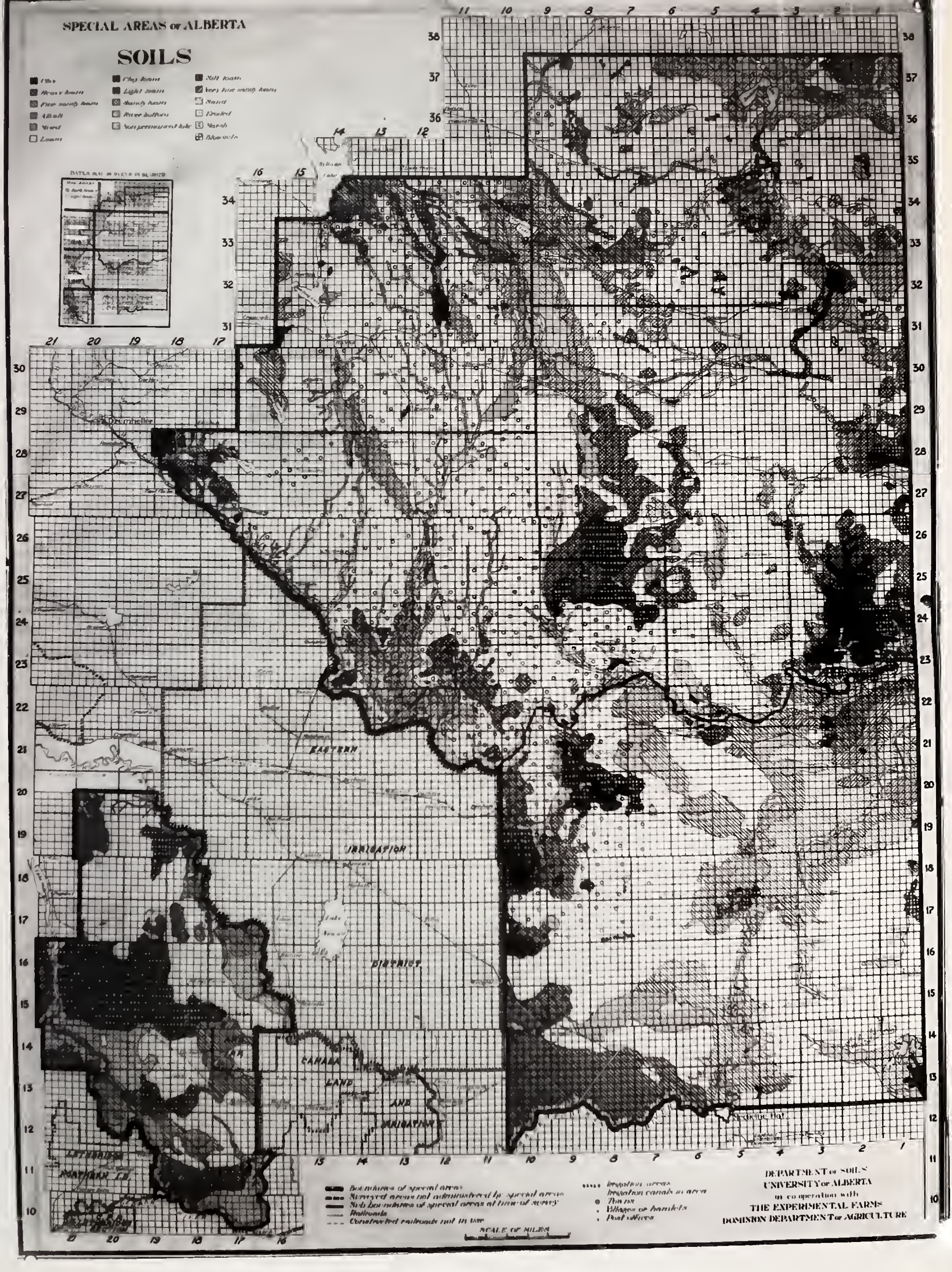
(1) See above p 44.


SPECIAL AREAS OF ALBERTA
SOILS
Clay
Heavy loam
Fine sandy loam
Alkali
Loam
Clay loam
Light loam
Sandy loam
River bottoms
Non permanent lake
Silt loam
Very fine sandy loam
Sand
Eroded
Marsh
Blowouts
Drumheller
EASTERN
IRRIGATION
DISTRICT
CANADA
LAND
AND
IRRIGATION
LETHBRIDGE
NORTHERN I.D.
Medicine Hat
Boundaries of special areas
Surveyed areas not administered by special areas
Sub boundaries of special areas at time of survey
Railroads
Constructed railroads not in use
Irrigation areas
Irrigation canals in area
Towns
Villages or hamlets
Post offices
SCALE OF MILES
DEPARTMENT OF SOILS
UNIVERSITY OF ALBERTA
in co-operation with
THE EXPERIMENTAL FARMS
DOMINION DEPARTMENT OF AGRICULTURE

A description of these two soil types is given in the appended soil code. These four soil groups taken together constitute 65% of the total area of the Neutral Hills. Tables XXIV to XXVII were compiled in an effort to ascertain the variability of the population of farm unit yields on any particular soil type from the average for that soil type. In order that this data might be comparable to that assembled for the land classes the same years are selected - 1927, 1931, 1932 and 1933.

In each case the heavier textured soils, due largely to their greater capacity to absorb and retain moisture and hence better resist drought conditions exhibit the higher average yields. The same two measure of dispersion are calculated for each year. Just as with the land classes the standard deviation for each soil type is approximately the same while the coefficient of variation is higher for the light brown soil zone because of lower average yields. The exception occurs in the case of sandy loams in the dark brown zone. The sample from which these averages is computed is so small as to be altogether unreliable. The variability for the entire area is again given but being on an area rather than a township basis does not permit of a comparison between bonusing on a soil type and a township basis.

As to whether the soil type or the land class constitutes

the more suitable method of grouping operators for bonusing purposes our data give little evidence either way. A factor which favors the soil type is that in the method of land classification quarters with heavy soils are graded down to lower land classes because of unfavorable physical characteristics. The effect of this is to increase the variability of average yields on the land class from their average.(1)

Another factor which tends to offset this advantage possessed by the soil type is the diversity in physical characteristics among various parcels of land belonging to the same soil type. Such physical features as stoniness, topography, and erosion have a definite effect upon yield. Where one or more of these physical characteristics is unfavorable the average yield will be considerably reduced. This factor tends to increase the variability of average yields per soil type from their average. To decide impartially between the land class and the soil type would then require a much more exhaustive analysis than is possible in this thesis.

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(1) See above p 65.

TABLE XXI

AVERAGE YIELDS OF WHEAT BY SOIL GROUPS

NEUTRAL HILLS SPECIAL AREA, ALBERTA

DESCRIPTION OF SOIL	AVERAGE YIELD PER ACRE 1921-1936 Bus. s.d	NUMBER OF SAMPLES
Medium to heavy loams in the dark brown zone	13.8	49
Silt loams in the light and dark brown zones	13.6	16
Medium to heavy loams in the dark zone - slight B. O.	12.7	11
Medium to heavy loams in the light brown zone level topography	12.7	48
Medium to heavy loams in the light brown zone topography rolling	11.2	18
Medium to heavy fine sandy loam in the dark and light brown zones	11.0	22
Clay and clay loam flats	10.0	2
Light to heavy B. O. loams in the light brown zone	9.8	54
Light loams in the light brown zone	9.2	25
Medium to heavy fine sandy loams and sandy loams in dark brown and light brown zone	8.8	4
Light loams with gravelly subsoils	8.3	4
Light sandy loams	8.0	7
Mixed soils	7.5	2
Sands, eroded, slough bottoms, marshes and alkali flats	6.0	1

Adapted from the Report on the Utilization of Land in the Neutral Hills Special Area - p 36.

PLATE VIII

SOIL CODE

CODE	DESCRIPTION
2 - 4 -	Medium to Heavy Loams in the Dark Brown Soil Zone
2 - 5 -	Silt Loams in the Dark Brown Soil Zone
2 - 1 -	Sandy Loams in the Dark Brown Soil Zone
2 - 2 -	Fine Sandy Loams in the Dark Brown Soil Zone
2 - 3 -	Very Fine Sandy Loams in the Dark Brown Soil Zone
1 - 4 -	Medium to Heavy Loams in the Light Brown Soil Zone
1 - 5 -	Silt Loams in the Light Brown Soil Zone
1 - 1 -	Sandy Loams in the Light Brown Soil Zone
1 - 2 -	Fine Sandy Loams in the Light Brown Soil Zone
1 - 3 -	Very Fine Sandy Loams in the Light Brown Soil Zone

TABLE XXII

AVERAGE WHEAT YIELDS BY SOIL TYPES FOR THE NEUTRAL HILLS SPECIAL AREA

1921-1936

YEAR	DARK BROWN SOIL ZONE				LIGHT BROWN SOIL ZONE				ENTIRE AREA	
	2 - 4 - 2 - 5 - Average Yield	No. Estimates	2 - 1 - 2 - 2 - 2 - 3 - Average Yield	No. Estimates	1 - 4 - 1 - 5 - Average Yield	No. Estimates	1 - 1 - 1 - 2 - 1 - 3 - Average Yield	No.s Estimates	Average Yield	No. Estimates
1936	2.15	113	0.72	11	1.54	138	0.82	53	1.6	680
1935	4.83	111	2.30	10	2.79	136	2.29	54	3.5	617
1934	5.54	107	3.10	10	3.31	134	2.28	32	3.8	523
1933	7.23	101	6.22	9	3.74	126	3.48	29	4.8	457
1932	15.40	104	12.57	7	13.50	130	11.44	25	13.4	448
1931	12.25	93	7.57	7	8.65	122	8.40	20	9.2	40[illegible]
1930	20.49	96	14.29	7	16.06	121	15.45	22	15.6	419
1929	4.79	87	6.38	8	4.54	119	2.57	21	4.5	381
1928	21.46	83	15.86	7	19.40	115	20.52	21	17.4	380
1927	28.14	73	16.67	6	25.87	108	22.95	21	25.0	350
1926	11.89	57	13.40	5	10.81	96	8.10	20	11.8	274
1925	20.48	54	17.00	5	19.12	92	12.68	19	19.0	259
1924	4.72	53	5.00	5	4.84	90	2.72	18	4.5	257
1923	25.98	52	19.60	5	29.12	90	22.95	19	26.4	261
1922	12.56	36	13.25	4	10.90	77	9.29	17	10.3	209
1921	17.83	32	15.00	4	12.35	75	9.50	14	13.1	199

TABLE XXIII

WHEAT YIELDS BY SOIL TYPES
FOR THE NEUTRAL HILLS SPECIAL AREA
FOR THE PERIOD 1921 - 1936

SOIL TYPE	AVERAGE YIELD 1921 - 1936
2 - 4 -) 2 - 5 -)	13.49
2 - 1 -) 2 - 2 -) 2 - 3 -)	10.56
1 - 4 -) 1 - 5 -)	11.66
1 - 1 -) 1 - 2 -) 1 - 3 -)	9.72
All Soil Types	11.5

TABLE XXIV

VARIABILITY OF WHEAT YIELDS BY SOIL TYPE

FOR THE NEUTRAL HILLS SPECIAL AREA

FOR THE YEAR 1927

	DARK BROWN SOIL ZONE		LIGHT BROWN SOIL ZONE		
SOIL TYPE	2 - 4 - 2 - 5 -	2 - 1 - 2 - 2 - 2 - 3 -	1 - 4 - 1 - 5 -	1 - 1 - 1 - 2 - 1 - 3 -	ALL SOIL TYPES
AVERAGE YIELD IN BUS.	28.14	16.67	25.87	22.95	25.0
STANDARD DEVIATION IN BUS.	6.85	9.77	9.70	9.15	8.9
COEFFICIENT OF VARIATION	24.33%	58.61%	37.48%	39.87%	35.70%

TABLE XXV

VARIABILITY OF WHEAT YIELDS BY SOIL TYPE
FOR THE NEUTRAL HILLS SPECIAL AREA
FOR THE YEAR 1931

	DARK BROWN SOIL ZONE		LIGHT BROWN SOIL ZONE		
SOIL TYPE	2 - 4 - 2 - 5 -	2 - 1 - 2 - 2 - 2 - 3 -	1 - 4 - 1 - 5 -	1 - 1 - 1 - 2 - 1 - 3 -	ALL SOIL TYPES
AVERAGE YIELD IN BUS.	12.25	7.57	8.65	8.40	9.2
STANDARD DEVIATION IN BUS.	7.55	4.47	5.64	5.09	6.0
COEFFICIENT OF VARIATION	61.62%	59.05%	65.20%	60.57%	65.80%

TABLE XXVI

VARIABILITY OF WHEAT YIELDS BY SOIL TYPE FOR THE NEUTRAL HILLS SPECIAL AREA FOR THE YEAR 1932

	DARK BROWN SOIL ZONE		LIGHT BROWN SOIL ZONE		
SOIL TYPE	2 - 4 - 2 - 5 -	2 - 1 - 2 - 2 - 2 - 3 -	1 - 4 - 1 - 5 -	1 - 1 - 1 - 2 - 1 - 3 -	ALL SOIL TYPES
AVERAGE YIELD IN BUS.	15.4	12.57	13.5	11.44	13.4
STANDARD DEVIATION IN BUS.	6.88	5.85	7.11	7.45	7.1
COEFFICIENT OF VARIATION	44.66%	46.54%	52.67%	65.12%	52.90%

TABLE XXVII

VARIABILITY OF WHEAT YIELDS BY SOIL TYPE
FOR THE NEUTRAL HILLS SPECIAL AREA
FOR THE YEAR 1933

	DARK BROWN SOIL ZONE		LIGHT BROWN SOIL ZONE		
SOIL TYPE	2 - 4 - 2 - 5 -	2 - 1 - 2 - 2 - 2 - 3 -	1 - 4 - 1 - 5 -	1 - 1 - 1 - 2 - 1 - 3 -	ALL SOIL TYPES
AVERAGE YIELD IN BUS.	7.23	6.22	3.74	3.48	4.8
STANDARD DEVIATION IN BUS.	4.26	3.68	3.20	4.08	3.89
COEFFICIENT OF VARIATION	58.92%	59.09%	85.53%	117.30%	76.00

Is not [illegible]

CHAPTER IX

CONCLUSION

In the preceding eight chapters of this thesis an attempt has been made to outline the position in which the prairie wheat farmer has for various reasons found himself. This position has been such as to render necessary the payment of a bonus on the production of cereal grains. The purpose of this bonus has not been to make up to individuals the losses which they have sustained in receiving an average yield less than normal. It is rather a bonus designed to enable operators who are hard pressed to keep body and soul together and their producing unit in condition to carry on with the arrival of better times.

Something has been said of the manner in which this bonus has been awarded and the inequalities which have resulted from its distribution. Finally the basis of need premised by the latest of this bonusing legislation has been accepted as valid. From that point this thesis has been concerned with determining whether the method of distribution of an acreage bonus on a township basis is a just one in the light of the standard of need which we have accepted. Having decided that this is not the case we have in the search for

a suitable alternative examined two other methods of awarding an acreage bonus.

These two methods were based upon the land class and the soil type. The lack of sufficient relevant data rendered it impossible for us to make an objective decision as to which of the three is the most equitable. In order to reach such a decision more adequate yield data and an analysis of this data on a township as well as on a land class and soil type basis would be necessary.

It has been pleaded in defence of the present legislation that sufficient knowledge and information was not available to implement a more satisfactory scheme. If it is found necessary to continue the practice of bonusing wheat production more equitable methods should be devised. To that end an exploration of the various possibilities cannot be amiss. It is hoped that the exploratory nature of this thesis may constitute a part of that evolutionary groping towards a more just and efficient method of bonusing wheat producers.

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